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Editorial Notes

Benzole Recovery

THE reconstructed works of the Gas Light and Coke Company was the subject of a recent Paper by Mr. R. T. De Gruchy to the Eastern District of the Southern Association of Gas Engineers and Managers, and the extract from the Paper published in last week's "JOURNAL" will have been studied with profit. It was one of very great interest from the viewpoint of benzole recovery. In 1932, when the Southend Gas Company was acquired by the Gas Light and Coke the proportions of coal gas and carburetted water gas were so adjusted that practically the whole production of coke was used in making water gas, which constituted a very high proportion—60 to 70%—of the gas sent out. In that year the amount of coke sold was 2,040 tons only. Efforts were put forward to build up a local coke market, and they met with immediate success. In a few years it became apparent that the capacity of the retort house, which was due for reconstruction, would become insufficient to supply the needs of the coke market, and in 1935 it was decided to build a new retort house of greatly increased capacity. By that time—a matter of three years only—coke sales had jumped from 2,040 tons to 13,900 tons a year.

The Gas Light and Coke Company had faith, justifiable faith, in the coke market. The plant chosen—a unit of Glover-West continuous verticals—was designed for coke cooling by secondary air, to facilitate the making of high quality gas for benzole extraction from Durham run-of-mine coal. By 1937 the coke sales had risen to 21,700 tons a year, and a benzole plant is being installed to recover 3 gallons per ton of coal carbonized. Tests on the Glover-West plant, as explained by the Author, have shown that there is no difficulty at all in making a gas of 540 B.Th.U.—10 B.Th.U. in excess of the anticipated working requirement of 530 B.Th.U. when recovery benzole and supplying a 500 B.Th.U. gas. The recovery plant which is being installed is an oil washing unit using a high oil circulation and distillation under vacuum. It will partially remove the organic sulphur compounds from the gas.

It is proposed to continue making 100% coal gas, which will increase the coke for sale by 18%, but, said Mr. De Gruchy, the indications are that the extra production will be absorbed locally, particularly in view of the number of new open coke fires installed, for which the coke is most suitable. If the curve of development of the coke sales at Southend from the year 1932 to 1937 is any criterion, Mr. De Gruchy has every reason to contemplate further development with optimism and the manufacture of a cheap gaseous therm.

Gas Purification

IN our issue to-day we publish extracts from Papers presented at the recent conjoint meeting held in Manchester of the Manchester Section of the Society of Chemical Industry, the Chemical Engineering Group, the Institution of Chemical Engineers, the Institute of Fuel, the Coke Oven Managers' Association, the Manchester District Association of Gas Engineers, and the Manchester and District Junior Gas Association. The meeting took the form of a symposium on gas purification, and the Papers read, as will be gathered from this "JOURNAL," were full of interest and contained a great deal of very useful information. They were by Authors who knew their subject thoroughly and kept very much to the point.

The reduction of organic sulphur compounds by oil washing was dealt with admirably by Mr. Charles Cooper. His Paper showed how the small works as well as the large can take advantage of the oil washing process, and how it can be carried out with only partial benzole recovery. Mr. H. F. Taylor discussed the relation of tar fog removal to oxide purification. He gave the results of analyses of oxides from works where electrical de-tarrers are installed. A study of these analyses has shown that when the de-tarrer is fixed between the condensers and the scrubbers a considerable reduction in the tar content of the oxide has taken place, but that the reduction is not as much as would be expected. It has also shown that in certain cases where the de-tarrer was working on gas at a comparatively high temperature there was little or no reduction in the high tar content of the oxide. Concluding his Paper, Mr. Taylor remarked that everyone interested in improving the efficiency of oxide purification will welcome the time when electrical de-tarring has become common practice. "In recent years," he said, "the oxide

has often had to eliminate from the gas up to 20 grains per 100 cu.ft. of ammonia, reduce the hydrogen cyanide down to 4 or 5 grains, remove the H_2S to pass the extremely stringent Gas Referees' test, and at the same time has been called upon to take out the 17 grains of tar fog which is the average figure obtained from the analysis of a large number of samples of oxide recently examined. If the contamination with tar could be reduced to only such traces of tar or gum-forming bodies as might elude electrical de-tarring, then the production of a higher quality spent oxide with the minimum of handling would result, and the cost of purification would be appreciably reduced."

Mr. Taylor's Paper recalls the discussion on the Communication by Mr. Hawkyard, of Tottenham, at the Institution meeting last June. Mr. Taylor asked for information on the question of the position of the de-tarrer in the gas stream. The consensus of opinion of those who joined in the discussion on Mr. Hawkyard's Communication was in favour of placing the de-tarrer at the outlet of the exhauster. The removal of tar fog by this type of plant confers very great benefits on the purification system.

Another Paper at the Manchester meeting was by Dr. G. E. Foxwell and Mr. Arthur Grounds on the Thylox process for the recovery of sulphur from gas—a process now in operation treating 350 million cu.ft. of gas daily. The Paper recounted the development of the process and brought the information concerning it up to date. The Authors pointed out that, as generally operated, the Thylox process does not extract 100% of the hydrogen sulphide from coal gas. They explained, however, that a two-stage process has been developed in the United States of America whereby the gas after being relieved of 90% of its hydrogen sulphide in a primary scrubber passes into a secondary scrubber where it is washed with a secondary Thylox solution which is freshly prepared and is very active for the removal of sulphuretted hydrogen. The sulphur is said to be reduced to less than 0·2 grain per 100 cu.ft., at which content the gas shows no tendency to discoloration of lead acetate paper. It is found, though, that by absorbing some 98% of the hydrogen sulphide and practically all the cyanides from the gas, the remainder of the hydrogen sulphide can be most conveniently absorbed in oxide catch boxes, which will require attention only at rare intervals. The Authors dealt with the economics of the process, concluding that it must be limited to fairly large installations, probably above 2 million cu.ft. of gas per day if it is to replace the oxide process on purely economic grounds.

The remaining Paper at the symposium was on the mechanism of oxide purification, by Mr. H. B. Avery. To obtain the maximum efficiency of the oxide the primary consideration is one of contact between the crude gas and the purifying material. As much surface as possible should be exposed to the gas. The continued activity of an oxide is not, however, fully explained by the operation of a large surface. Mr. Avery gave the results of an investigation made to discover what was the further function, and the conclusion at which he arrived is very interesting. It would appear that during the purifying process there is a migration of the iron to the surface of the particle. In the experiments described in the Paper, spent oxides were examined microscopically. Microscopic slides were prepared and colour photographs of the sections made on Dufay film. These sections showed an outer layer of ferric oxide and an inner layer of sulphur, crystalline in structure, supported on and closely adhering to the core of lightening material. From the appearance of the sulphur forming the inner layer, Mr. Avery assumed that it had been subjected to a sufficiently high temperature to cause fusion and subsequent crystallization.

The symposium was the means of bringing together a great deal of valuable information, much of which was new, and our extracts from the Papers presented indicate the vast amount of research work undertaken to improve the efficiency and lower the cost of gas purification.

Pointing the Way

WHILE every gas undertaking, irrespective of size and of purposes for which large or small proportions of its commodity may be utilized, must have been adversely affected last year by the peculiar warmth of certain months during which conditions of temperature are usually less genial, some undertakings to a greater extent than others were additionally handicapped by influences apart from this. Take, for instance, the industrial load. From the point of view of industry in general, 1938 would not be reckoned a good year. There have, of course, been many worse; but last year suffered by comparison with some of its immediate predecessors in the matter of industrial activity, and so gas undertakings were affected according to the proportion of their output that was dependent upon the state of trade. For example, in the case of the Lea Bridge District Gas Company the decrease in the sale of gas during the past twelve months is stated by the Directors to have been due to a large extent to a reduction in the supply for industrial purposes. That a shrinkage in trade demands should have coincided with unduly high temperatures through certain portions of the gas-heating season is unfortunate, but not unhopeful.

With regard to the weather it is useless to prophesy, but so far as the industrial gas load is concerned we are on safer ground, and here the omens are favourable. Therefore the stockholders in the Lea Bridge Gas Company have every justification for faith in the statement of their Chairman, Mr. Arthur M. Paddon (whose Address at the annual general meeting will be found on a later page of this issue of the "JOURNAL"), that, taking the prospects in general, he thought they should do as well in the current year as they had done in the past. With the improved trade position that now seems to be building up, the Company may even do better. They have a large industrial load, and this, as the Chairman remarked, is advantageous in its regularity and stability during those hours of the day when the Company can most economically deal with it. On the other hand, such a load is disadvantageous in that big units are disturbed by the loss of industrial consumers. For instance, the Lea Bridge Company have suffered a reduction of 59 million cu.ft. in the consumption of a single consumer. An important feature of an industrial load, as the Chairman said, is its value in educating the public in what gas can do. In other words, in pointing the way. Broadly considered, in fact, the industrial load is of the greatest possible advantage as an advertising medium.

Looking Ahead

THERE can be nothing but satisfaction on the part of all concerned with the far-sighted policy that is being pursued by the Cambridge University and Town Gas Light Company. That the Directors are full of confidence with regard to the future, and that they rightly appreciate the advantages of taking time by the forelock, is evidenced by the report of the proceedings at the annual meeting of proprietors

which appeared on p. 676 of last week's issue of the "JOURNAL." From this it is seen that the Company have applied for an Order for the extension of their area of supply so as to include four parishes in the Rural District of Chesterton and three parishes in the Rural District of South Cambridgeshire; and this is being done, not necessarily because the Company contemplate an immediate extension of their activities to these districts, but in order that they may be in a position to make use of the new powers if (and when) a suitable opportunity occurs.

Further, the Company have entered into a contract with the Woodall-Duckham Vertical Retort and Oven Construction Company, Ltd., for one of their new static vertical retort plants. This installation, which is to be capable of producing approximately 1½ million cu.ft. of gas in 24 hours, will be of the most-up-to-date type, and will comprise ten retorts, each carbonizing about 8 tons of coal in 24 hours. In this design of carbonizing plant the hot coke is lowered into a cooling chamber situated immediately below the retort —thus obviating the necessity of quenching the coke with water. Special arrangements are, it is said, also being made in respect of the charging of the retorts. In fact, in the whole of the negotiations the Directors have borne in mind, not only the cost of production, but their desire to have a plant which would offer the maximum of atmospheric cleanliness together with improved working conditions for the operating staff.

It would seem that all the Company need to cause a resumption of the upward trend in gas sales is a return to normal temperature conditions in the spring and autumn of the year. The number of consumers continues to rise, and there is considerable activity in mainlaying operations.

Competition in Lighting

IN spite of very severe competition the sales of gas for public lighting are increasing. The Gas Industry can offer an efficient and economical illuminant, and a thoroughly reliable one. It has developed equipment second to none in meeting modern requirements, and at the same time it has developed the necessary specialized technique—and public lighting is work for the specialist—to apply the new equipment to the best advantage. The latest Board of Trade figures show that since 1921 the quantity of gas used for street lighting has more than doubled. It has now reached 14,482,866,000 cu.ft. per annum, and this represents a considerable percentage of total sales. Several references to the growth of the street lighting load have been made at the annual meetings of gas companies reported in the "JOURNAL" in recent weeks—to the thousands of new public gas lamps installed.

As we have said, this increase is in the face of very severe competition—competition which all too frequently is the reverse of fair. Any decision regarding which illuminant, gas or electricity, to employ should be based on the merits of the two in relation to cost and the conditions to be fulfilled, and not on prejudice. Few of those responsible for local government are lighting experts; unfortunately many do not approach public lighting problems with an open mind. Without weighing up the facts, they express opinions and arrive at decisions in favour of electricity simply because electricity happens to be a newer—not a better—illuminant than gas; and it is common to find up-to-date electrical installations compared with obsolete and inferior gas installations. Nor is it necessarily the fault of the gas undertakings concerned that their public lighting is behind the times. They are often not allowed the chance to demonstrate what modern gas lighting means, though it must be admitted that in some places gas undertakings have shown, and still show, apathy in the street lighting load—which, in view of the excellent equipment now available and the technical services which the manufacturers so freely offer, is, of course, all wrong.

To return to the sort of competition the Gas Industry is called upon to face in the public lighting field, we would cite an instance which came to our notice a day or two ago. A public lighting contract was due for renewal in a certain area. The amounts of the tenders were exactly the same. There was, however, a difference in that the gas undertaking offered at least double the candle-power for the same money. The contract was given to electricity. It is difficult at first sight to appreciate exactly why, but maybe a clue is given by a letter sent by the electricity undertaking three or four days before the tenders were opened to all the councillors in the area concerned. We have before us a copy of this letter; it is very interesting indeed.

The letter was, in fact, in the nature of a veiled threat. Having referred to the fact that there was "some talk of gas competition," the letter went on to state that the electricity undertaking would be unable to supply public lighting outside the town area at anything like the existing figure if it lost even part of its public lighting contract, and that, in view of the heavy expenditure incurred in affording a supply outside the town area, it might be necessary to increase charges for general supplies if the undertaking suffered loss of revenue from public lighting. The undertaking offered to supply statistics concerning conversions taking place from gas to electricity, proving "most conclusively" that the general trend throughout the British Isles is towards more and more electric street lighting. Then, among other points advanced, the fact that the undertaking was responsible for giving employment to people resident in the area was mentioned—a fact which, of course, applies with greater force to the gas undertaking.

The foregoing letter is not a pretty example of fair competition, but there it is. It is true that more electricity is being used for public lighting. It is also true that more gas is being used for the same purpose. There is a bias in too many instances towards electricity because it is "fashionable," and not because of any superiority of electricity over gas for public lighting. There is too much ignorance among councillors and the general public in respect of what gas can accomplish in the field of street lighting; the idea is held by many that gas is a back number. As we have remarked before in these columns, it is most important that those responsible for local government should be made fully aware of the progress of gas; and in this regard every member of the personnel of a gas undertaking can play his part.

Dry Cooling of Coke

A good account of the satisfactory operation of the Collin dry coke cooling plant working in conjunction with an installation of C.O.L. intermittent chamber ovens at Stalybridge was given in a Paper by Mr. E. Bates to the Manchester and District Junior Gas Association on March 4—see last week's "JOURNAL," p. 666. The economics of dry cooling as distinct from water quenching were not dealt with, but it must be extremely difficult to translate into terms of £ s. d. the many advantages of the system. These the Author set out clearly. Dry-cooled coke is easily ignitable, and, because it is less friable than water-quenched coke, less breeze and fines are produced. The coke is cleaner, which makes for better grading. The steam raised from the sensible heat of the

coke can be put to good purpose. Corrosion of steelwork is avoided; this must mean a considerable saving in maintenance costs. The nuisance from steam, smoke, and dust is avoided; and, as a further advantage, there are no "fliers" from the coke on burning. "The coke cooling plant," said Mr. Bates, "has proved to be trouble free, the only expense incurred over a period of three years' working being the renewal of the swivel bolts used for tightening-up the discharge doors. . . . On light loads the steam generated per ton of coke cooled is low, but it is considered well worth while to cool the coke rather than quench it, in order to gain the many other advantages, for the coke produced by intermittent vertical ovens in conjunction with the dry cooling plant is of exceptional quality and in this case finds a ready local market." Those in the Stalybridge district of supply are fortunate in being able to procure an excellent coke with an ash content below 8%. We are sure that in catering actively for the coke market the Stalybridge Gas Department is adopting a paying policy which is helping the sale of gas.

Letter to the Editor

Holding Companies

SIR,—With reference to your editorial note of last week to the effect that an investigation with regard to holding companies is not by any means urgent, I do not know how it may be with gas holding companies, though certainly I have not myself heard any complaints.

The position, however, appears to me to be very different in regard to electricity companies which are not regulated, especially as to the raising of capital, price, and dividends, in the same way as gas companies. In some cases at any rate electricity holding companies would seem to have taken advantage of the position, and the McGowan Committee appears to have come to the conclusion that something requires to be done. The report of that Committee refers to various examples of what are described as "abuses," and these words are then used:

> "There may be other possibilities of abuse inherent in the holding company system, such as the transfer of an undertaking from one subsidiary company to another at an enhanced value, which would thereafter distort the relationship between profits and capital expenditure, but the above examples will suffice to show that the holding company structure contains certain possibilities of charges for electricity being maintained at an unnecessarily high level.
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> ". . . We consider it most desirable that such abuses should be rendered impossible."

I suggest, therefore, that, however matters may stand in regard to gas, a very large number of consumers of electricity will welcome wholeheartedly the proposed enquiry and will think that the sooner it is held the better.

Yours, &c.,

"CONSUMER OF BOTH GAS AND ELECTRICITY."

March 10, 1939.

William Murdoch Centenary

The Centenary of the death of William Murdoch falls on Nov. 15, 1939.

A Joint Committee has been formed, composed of representatives of the National Bodies in Scotland and the North British and Waverley Associations of Gas Managers. Discussions are taking place with a view to holding a suitable event in November next to commemorate his work.

Personal

At the annual meeting of the Newport (Mon.) Gas Company on March 10, Mr. J. H. CANNING, O.B.E., J.P., Engineer and Manager, was nominated to a seat on the Board of Directors. Mr. R. Wilson Bartlett, J.P., F.S.A.A., who presided in the absence through indisposition of Major Julian Day, Chairman, referring to a resolution to increase the number of Directors from six to seven, said that owing to the recent severe accident to Mr. Canning it was proposed that he should retire from the position of Engineer and Manager in the near future. The Board were extremely anxious that they should be in a position to take advantage of Mr. Canning's wonderful knowledge of the Company and its workings by nominating him to a seat on the Board. Mr. Canning expressed regret that he had to sever his managerial and technical connexions with the Company, but the effects of his accident, he considered, made it unfair both to the Company and to himself that he should try to continue to carry out his heavy duties.

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Mr. J. M. MACLUSKY, Assistant Engineer and Manager to the Wakefield Gas Light Company, has been appointed Engineer and Manager to the Calverley and Horsforth District Gas Company. Mr. MacLusky was trained at the Tradeston Gas-Works, Glasgow, and at Torquay, and served as Technical Assistant to the Keighley Corporation Gas-Works before taking up his present position at Wakefield 6½ years ago.

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Colonel FORRESTER CLAYTON, the Chairman of Thomas Clayton (Oldbury), Ltd., was on Saturday last elected a member of the London Passenger Transport Board.

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Mr. B. PRIESTLEY has retired from the position of Works Superintendent of the City of Plymouth Gas Department after 25 years' service. Mr. F. Blackburn (Engineer and General Manager) presented Mr. Priestley on behalf of the Staff with a canteen of cutlery, and wished him well in his retirement.

Obituary

A fortnight after his retirement from the Secretaryship of the Enniskillen Gas Company, a position which he had held for a number of years, Mr. FRANCIS A. SADLIER passed away. He received a presentation from his colleagues on his retirement.

Forthcoming Engagements

March

15-16.—B.C.G.A.—District Conference at Bedford.
16.—I.G.E.—Refractory Materials Joint Committee, 2.30 p.m.
16.—L.C.C.A.—Joint Committee, 4.30 p.m.
16.—Midland Juniors.—Visit to Staveley Coal and Iron Company, Ltd., Chesterfield.
17.—B.G.F.—Joint Exhibition Committee, 3.30 p.m.
17.—Southern Association (Western District).—Commercial Meeting. Rougemont Hotel, Exeter, 2.30 p.m.
18.—Wales and Monmouthshire Juniors.—Meeting at Pontypridd. Paper by K. Muir.
18.—Western Juniors.—Meeting at Exeter. Visit to Works of Willey & Co., Ltd. Paper by F. A. Rhead.
18.—Yorkshire Juniors.—Meeting at Bradford. Paper by R. Anderson, "Gas-Fired Heating Installations at Bradford."
21.—B.C.G.A.—Annual Meeting of Members in Manchester District, to be held at Manchester, 2.15 p.m.
21.—I.G.E.—Gas Education Executive Committee, 2.30 p.m.
24.—Southern Association.—Annual General Meeting, Hotel Victoria, W.C. 2, 2.30 p.m. Presidential Address of F. Blackburn.
25.—Scottish (Western) Juniors.—Annual Business Meeting, Christian Institute, Bothwell Street, Glasgow. Address by W. McL. Dick.
28.—S.B.G.I.—Council Meeting, 2.30 p.m.
29.—Southern Association (Eastern District).—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Fuel Economy in Gas-Works."
30.—Midland Juniors.—Paper by H. G. Broadbridge, "Recent Developments in Control of Continuous Vertical Retorts."
31.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.

April.

3.—L.C.C.A.—Technical Committee, 2.30 p.m.
5.—Manchester and District Juniors.—Visit to Corby Works of Messrs. Stewarts & Lloyds, Ltd.
5.—Yorkshire Juniors.—Visit to Corby Works of Messrs. Stewarts & Lloyds, Ltd.
8.—Scottish Juniors (Eastern).—Visit to Pumpherston Refinery of Scottish Oils, Ltd.
14.—North British Association.—Spring Meeting at Leven.

News of the Week

During Cooker Fortnight the Great Grimsby Gas Company are giving a free gas poker to all purchasers of cookers.

Some of the Two Thousand By-Products of Gas, ranging from explosives to perfumes, are displayed in an exhibit which has been arranged by the Curator of Accrington Museum (Mr. A. Hanson) in the mineralogical section.

An Extension of their Area of Supply is among the provisions of a Special Order under the Gas Undertakings Acts, 1920 to 1934, for which the Ashford (Kent) Urban District Council Gas Department intend to apply to the Board of Trade.

First Aid Measures are very advanced at Liverpool. Sir Christopher Clayton, Chairman of the Directors, stated last week that there were 78 fully qualified St. John Ambulance men in the Company, and they had 248 volunteer stretcher-carriers who were undergoing their training out of working hours.

The House of Commons Kitchen and the Chancellor's official residence are both described in the Spring issue of *The Flambeau* (published by the B.C.G.A.). Also in this issue are practical articles on kitchen planning, house moving, hot weather entertaining, and water heating (plenty of gas propaganda here); and there is a two-page illustrated inducement to readers to visit their gas showrooms. This issue of *The Flambeau* is a real business-getter. Make good use of it, and let it pave the way for your salesmen.

On Friday last the Fuel Department of Leeds University held its annual dinner, when the Livesey Professor, Dr. D. T. A. Townend, presided over a gathering which included several distinguished guests. Mr. E. V. Evans, General Manager of the South Metropolitan Gas Company, spoke of the thoroughness of the courses at Leeds and said how highly the Gas Industry appreciated the work of the Livesey Professors and the research staff. Dr. R. J. Sarjant also paid tribute to the value of the research work undertaken with such conspicuous success at Leeds University.

Following an Increase of 6d. per 1,000 cu.ft. in the price of Kendal's gas about three months ago, the Gas Committee of the Town Council took steps to ascertain whether anything could be done to effect savings in production and distribution. Tests were made, and it was found that 153 other undertakings had less consumption per mile of main than Kendal, and 63 had more. Comparing the make of gas per ton of coal with 23 other undertakings, only four of them had better figures than Kendal, while the other 19 were below. These facts were reported to the Town Council last week by Alderman J. J. Thomas, who added that the Gas Committee were satisfied that the Department was being economically managed.

The Calorific Value of the gas supplied by the Nantwich Gas Company as from June 26 will be 450 B.Th.U. instead of 400 B.Th.U. as at present.

A New Gas Office, the frontage having a show window, has been erected by Dunbar Town Council which should prove of much advantage to the Gas Undertaking.

The Popularity of Gas Refrigerators in North Queensland has been proved conclusively. At Cairns—one of the hottest towns in Australia—52 gas refrigerators were sold between July 1 and Nov. 24 last. Four electric refrigerators were sold in the same period. It is interesting to note that whereas the local gas company alone is interested in the gas appliance, no fewer than nine agents are prepared to do business with one or another electrical refrigerator.

Gas Cooker Fortnight opened at the showrooms of Cambridge University and Town Gas Light Company on March 6. Demonstrations are being given by Mrs. D. J. Latham, 1st Class *Diplomée*, N.T.S.C., of the Radiation Research Kitchen, while a comprehensive range of appliances is on view. Cambridge housewives at the demonstrations were particularly interested in a large dial over the cooker showing the exact amount and cost of gas used for a particular purpose.

The Visit of the "Perfect Nazi Woman," Frau Gertrud Scholtz-Klink, to our shores has not been without interest to the Gas Industry. She came on a short visit to London to study the work done by and for Englishwomen. Among those present at a dinner given in honour of Frau Scholtz-Klink by the Anglo-German Fellowship at Claridge's on Tuesday evening of last week was Miss K. M. Halpin, of the Women's Gas Council. During her three-day stay, Frau Scholtz-Klink visited Kensal House.

A Conference on Profit-Sharing and Co-partnership, arranged by the Industrial Co-partnership Association, was held by courtesy of the Directors of the Lea Bridge District Gas Company at the Institute of the Company, the Gas-Works, Lea Bridge Road, Leyton, E.10, on Wednesday, March 8, 1939, at 3 p.m. Mr. D. C. Cross, Engineer and General Manager of the Lea Bridge District Gas Company, took the Chair, and the speakers included Mr. H. Todd, Thornbery, Governing Director of Griffiths Bros. & Co. (London), Ltd., paint manufacturers, Bermondsey, Mr. J. Gray Mathieson, Managing Director of Clarke, Nickolls, & Coombs, Ltd., confectionery manufacturers, Hackney, and Mr. F. W. Raffety, Chairman of the Industrial Co-partnership Association. Tea was served during the afternoon. The Secretary of the Industrial Co-partnership Association, 36, Victoria Street, S.W.1, will be glad to send further information to those interested.

Joint Gas Conference

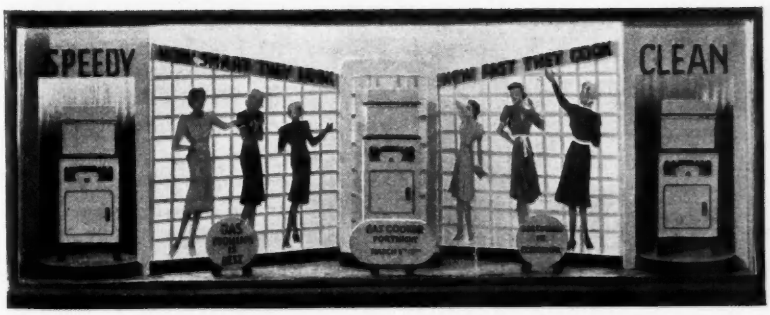
British Industries Fair, Castle Bromwich

It has unfortunately been impossible to obtain for publication in this week's issue a report of the discussion on the Joint Conference Papers which we gave in last week's issue of the "JOURNAL." We shall, however, publish the report as soon as it is available.

Women's Gas Council

Manchester's Lantern Lecture.

At a meeting of the Manchester Branch of the Women's Gas Council in the Lecture Theatre of the Manchester Gas Showrooms, Town Hall, on Wednesday, March 1, Mrs. Henry Lidderdale gave a lantern lecture, entitled "The Power of the Press," at afternoon and evening sessions.



This striking display has been arranged in the entrance hall at Gas Industry House in support of the Cooker Fortnight campaign from March 6-18. The unusual panels of trellis in front of a background of pale blue corrugated cardboard make an attractive setting for the smartly dressed figures of housewives, who are all pointing to the "pièce de résistance"—the gas cooker, displayed on a double baseboard in the centre. Blue cut-out letters are used for the slogans on the trellis and pillars, while the floor of the window is covered in royal blue "Feltex" in harmony with the whole setting.

Toxic Gases in Industry

Detection of Sulphur Dioxide and Benzene Vapour

The Department of Scientific and Industrial Research has issued two further leaflets in the series describing standard methods for the detection of poisonous gases produced in industrial processes. These deal with sulphur dioxide and benzene vapour respectively.

In the leaflet on sulphur dioxide (Methods for the Detection of Toxic Gases in Industry, Leaflet No. 3, published H.M. Stationery Office, 2s. 6d. net), it is pointed out that a concentration by volume of one part in 2,000 is dangerous for even short exposures and one part in 100,000 is the maximum concentration allowable for several hours' exposure. The standard method developed for the detection of this gas depends on drawing a sample of the atmosphere by a hand-pump through test-paper treated with starch and potassium iodate to which potassium iodide has been added. The test-paper becomes stained a brownish colour and the concentration is determined by comparing the stains with a standard colour chart supplied with the leaflet. Concentrations down to one part in 250,000 can be estimated by making not more than ten strokes with the hand-pump. Complete instructions for carrying out the test are given in the leaflet.

Benzene is dealt with in Leaflet No. 4 (published H.M. Stationery Office, 3d. net, no standard colour chart being necessary in this case). Benzene vapour may be encountered in dangerous concentrations in many industrial situations, including cellulose paint and lacquer works, gas works and coke ovens, paint and varnish works, spray-painting works, and tar distilling works.

In high concentrations benzene vapour acts as a narcotic (acute poisoning). In low concentrations over a prolonged period it affects the blood and the blood-forming organs of the body (chronic poisoning). Individual susceptibility is well recognized, women and young persons being particularly liable to suffer from chronic poisoning.

The chemical test recommended in the leaflet is capable of detecting concentrations down to one part in 10,000. The test involves the absorption of benzene vapour in concentrated sulphuric acid containing a trace of formaldehyde. An orange brown colour is produced, even traces of benzene being sufficient for this result. The test is carried out by drawing a sample of the atmosphere under test through a tube containing the reagent by means of a hand-pump of definite capacity, and determining the number of strokes required to produce a certain standard depth of colour. From the number of strokes of the pump required to produce the standard colour, the concentration of benzene vapour present is obtained by reference to the table given in the detailed instructions in the leaflet.

A foreword to the leaflets explains that a paragraph of the Chemical Works Regulations, 1922 (made under Section 79 of the Factory and Workshop Act, 1901) prohibits entry into any place which might contain dangerous gas by any person not properly protected until the air has been tested and found safe to breathe. To meet this requirement, the question of simple and rapid chemical or other methods for determining low concentrations of dangerous gases, such as may occur in various circumstances in industrial works, was discussed by the Association of British Chemical Manufacturers with the Home Office, and as a result arrangements were made by the Department of Scientific and Industrial Research, at the request of the Home Office and with the financial and technical co-operation of the Association of British Chemical Manufacturers, for a series of tests to be developed by the Chemical Defence Research Department.

A Correction

In the comparative statement of working results of the Metropolitan and Suburban Companies in 1938, compiled by Mr. E. Cowee ("JOURNAL" for March 1, p. 566), the figures for the Commercial Gas Company should read: Dividend and interest 2·06d.; deficit 0·10d.

A New Showroom Frontage

This attractive new frontage has been built on to the showrooms of the Hassocks and District Gas Company. The stall risers, pilasters, and fascia are constructed of polished grey granite with bon accord granite surrounding the entrance and forming the capping above the fascia. The window sashes consist of heavy bronze architrave moulding, the exterior of the door and frame being faced in bronze metal. There is no exterior lighting of the premises, but the interior is chiefly illuminated by means of strip lighting above the windows and concealed from outside view, which produces a very pleasing effect. The windows, as can be seen, afford a complete view of the interior of the showrooms. The work was carried out by Messrs. E. Pollard & Co., Ltd., of St. John Street, E.C. 1, whose treatment strikes a novel note.

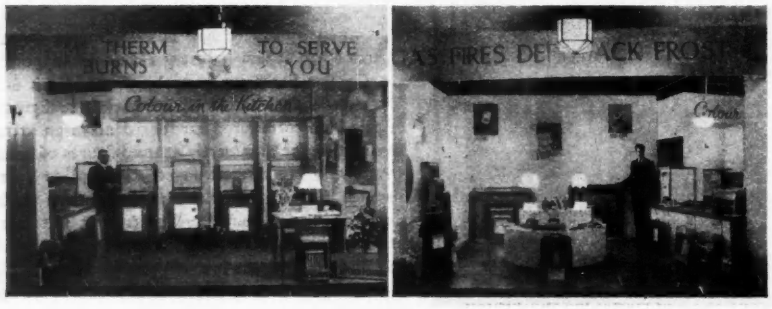
The Water Engineer's Handbook and Directory*

1939 Edition

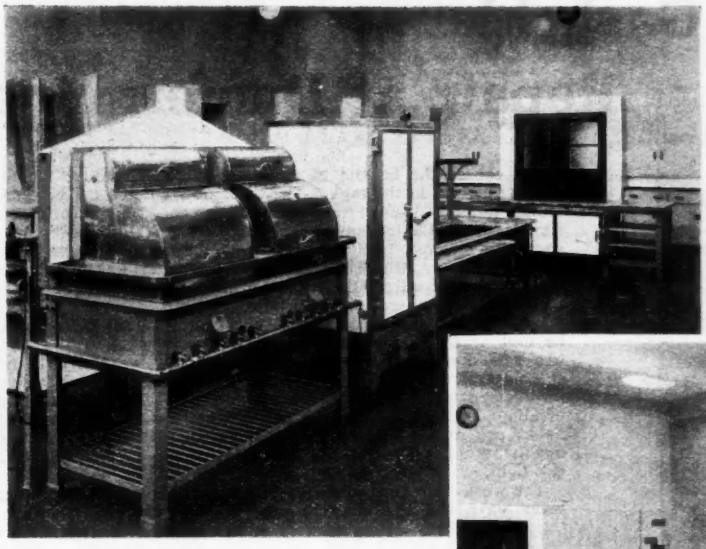
Claimed to be the most complete and comprehensive directory of British water undertakings ever published, the "Water Engineer's Handbook and Directory" for 1939 has been thoroughly revised up to the end of last year and includes such useful information as source of supply, character and treatment of water, and developments contemplated. The hardness of water in all districts is clearly indicated.

Full lists of chief engineers; managers; resident, deputy, and assistant engineers, secretaries, and analysts of water undertakings at home and abroad are given as well as complete lists of catchment and drainage boards with names and addresses of the principal officials. Tabulated statistics in each case show populations served, consumption, storage, and distribution, indicating the comparative importance of undertakings. Among a selection of excellent articles is found authoritative information on waterworks administration, pumping plant, developments in methods of construction, treatment of water, rating and valuation, rainfall, and progress in 1938. Finally there is included a compact but comprehensive, and now considerably extended, section of data and formulæ constantly required for reference.

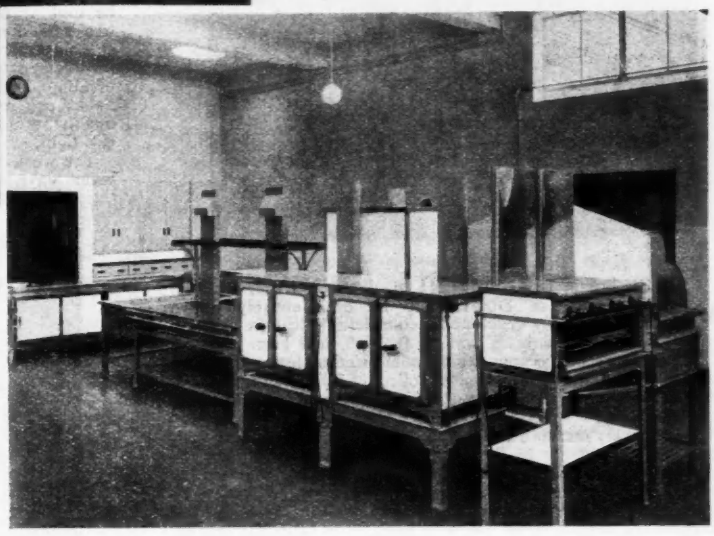
* Water and Water Engineering, 30 and 31, Furnival Street, Holborn, E.C. 4. Price: 8s. 6d. By post, 9s.



The Isle of Thanet Gas Light and Coke Company were once again responsible for arranging a striking display at a recent exhibition held at Margate. We reproduce here photographs of two of the sections devoted to various applications of gas. Another consisted of a model kitchen in which a thermostatically-controlled gas-heated tank containing tropical fish attracted much attention. Good use was made of apt gas slogans above the sections and on the side pillars.



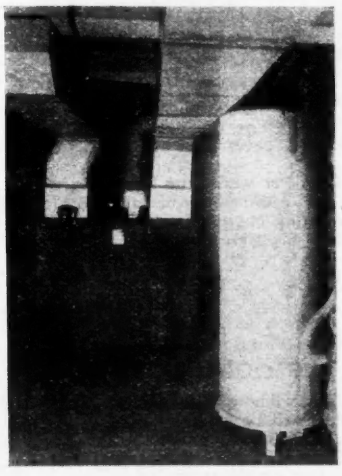
All-Gas Catering in New Luton and Dunstable Hospital



We referred briefly in a recent issue to the opening by Her Majesty Queen Mary of the new Luton and Dunstable Hospital, when we gave a photograph of Her Majesty standing beside one of the gas ranges in the kitchen. The accompanying illustrations give general views of some of the Radiation appliances in the main kitchen of the hospital. All the gas apparatus was supplied through the Luton Gas Company.

Air Conditioning Plant

A Bryant air conditioner has been installed in a private dwelling house in Stonehaven. It consists of a unit containing air filters, electric motor and fan, along with heating chamber and humidifier, and although it is not the smallest unit available, the space occupied is only 56 in. × 29½ in. × 49¼ in. high. All gas, electric, and temperature controls are entirely automatic. The input of the plant is 125,000 B.Th.U. per hour, the air delivery being 1,250 cu.ft. per minute.



The Bryant Installation.

During erection of the house, gratings or openings were left in the side walls at the skirting and also the ceiling levels of all the rooms. Ducts were installed within the walls, these being connected to main flow and return ducts, the former having communication with the gratings in the walls at ceiling level, the latter having communications with the gratings at the skirting. The main ducts are carried along and connected to the plant in the basement of the house.

When in operation, the vitiated air is removed from the lower level of all the apartments, this being replaced through the gratings at ceiling level by a fresh supply of air heated to the temperature required for maximum comfort, filtered, humidified, and circulated evenly throughout, giving each room an adequate volume, without disturbing noises from within or without.

The degree of heat is controlled by an automatic thermostat, this being fitted in the hall of the house.

During summer, heat will not be required; the apparatus, however, will be used to give good ventilation and comfort by circulating clean filtered air.

Incidentally, it may be mentioned that gas is also used in this house for water heating, cooking, and refrigeration.

The Permutit Company, Ltd.

Increased Net Profit

The twenty-fourth annual general meeting of the Permutit Company, Ltd., was held on March 1 at the Company's Offices, Mr. J. W. MURRAY (the Chairman) presiding.

The Chairman explained the balance-sheet in detail, which showed a net profit for the year of £15,306, against £10,068 for the previous period. With the balance brought forward from 1937 of £10,268, the available balance is £25,574, and he stated:

This amount the Directors recommend to be dealt with as follows: Confirm payment of one year's dividend to Dec. 31, 1938, on the 8% Preference shares, £2,620; payment of a dividend of 8%, subject to tax, on the Ordinary shares, £8,000; write-off patents and licences (reducing the book value to £25,000), £455; and carry forward, £14,499; total, £25,574.

The Chairman referred to a new process of water treatment under the name of the Permutit Hydrogen Ion Process. The results obtained from those installations already working have been most satisfactory. The Permutit Hydrogen Ion Process has been further developed to include the treatment of any normal water, whether it be drawn from a public, canal, or river supply, without distillation and produce a water in every way comparable with distilled water.

As to the prospects for the current year the value of the unexecuted orders in hand at the end of 1938 showed a substantial advance over the value of the unexecuted orders in hand at the end of 1937—and the orders received during the first two months of 1939 also exceed in value those received in the corresponding period of last year.

An Interesting Gasholder Repair at Dunfermline

A STEEL holder tank, 132 ft. 1½ in. diameter by 27 ft. 8 in. deep, erected at Dunfermline in 1922 entirely above ground, suddenly developed a considerable leak in the tank bottom. Fortunately a brick wall, 3 ft. high, had been built on the circumference of the concrete foundation, thus leaving a space along which the water flowed and collected in the sump at the inlet and outlet pipes, and from which it was pumped and returned to the tank.

This temporary measure enabled us, writes Mr. James Campbell, Engineer and Manager to the Dunfermline Gas Department, to keep the holder in commission, thereby giving time for consideration of the best means of repair.

The method of carrying out the repair was as follows: On the outside of the tank a steel box was built, level with the top of the tank. The box was 4 ft. 6 in. wide, 4 ft. 6 in. deep, and 3 ft. from back to front, and was made up of $\frac{7}{16}$ in. plate and angles bolted together. Before fixing this box part of the gangway and railing was removed and then bolt holes were drilled one at a time in the tank plates, using the previously drilled angle iron as template. After each hole was made, a bolt, with a grummet attached was passed through from inside the tank and fixed by a nut to the angle iron. When this exterior box was completed and made watertight, an opening, 3 ft. square, was cut in the side of the tank, the bottom edge being level with the bottom of the box. To cut this aperture, $\frac{7}{8}$ in. diameter holes were drilled as close to each other as possible, and as each hole was made a cork was fitted to prevent water from the tank flooding the box. Two holes (which were afterwards plugged) were drilled in the bottom of the box to drain any leakage that occurred. The diver, with his suit minus the helmet, now entered the box and cut the divisions between the holes, thus forming a clear 3 ft. square opening in the tank wall. The water was now, of course, at the same level in the tank and box.

Meantime, the gasholder of 1¼ million cu.ft. capacity, had been completely filled and was maintained just below blowing off point, which caused the bottom of the outer life to be above the top of the aperture in the tank. The diver now entered the box, and letting himself through the aperture, descended by means of a rope ladder to the bottom of the tank. He quickly discovered the source of leakage, being guided by hammer signals given by an outside observer, who signalled when the water was discoloured by the fine sludge from the bottom of the tank. It was found that a portion of a flanged joint had failed.

He returned to the surface to report, and on his next descent he took with him a number of small wooden wedges of such a size and shape as could be inserted beneath the flange in the space formerly occupied by the jointing, and over these wedges he smeared tallow. We then passed down to him a stiff mixture of about half a hundredweight of cement fondu and sand which he heaped over the flange and wedges, thereby making a thoroughly sound job, which, although carried out two years ago, is still tight.

The work of preparing and fixing the box, &c., occupied about seven days, but the diver was under water for less than one

hour, during which short period the gasholder valves were shut, a very great convenience. The box has been kept in position, although by drilling holes for a cover plate for the 3 ft. square opening it could be removed.

The photographs show the diver within the box preparatory to entering the tank, and the box attached permanently to the tank.

The above method of carrying out repairs, and its application in various forms to new tanks is covered by patent number 21751 of 1936.

Eastern Counties Association

The Spring Meeting of the Eastern Counties Gas Engineers' and Managers' Association will be held at Grimsby on May 25-26 under the Presidency of Mr. J. Kennington, Engineer and Manager of the Great Grimsby Gas Company. The usual Golf and Bowls Competitions will take place on May 24.

Southern Association

The Annual General Meeting of the Southern Association of Gas Engineers and Managers will be held at the Hotel Victoria, Northumberland Avenue, W.C. 2, on Friday, March 24, under the Presidency of Mr. F. Blackburn, Engineer and General Manager of the Plymouth Corporation Gas Department.

Manchester District Association

The Sixty-Ninth Annual Meeting of the Manchester District Association of Gas Engineers will be held at the Midland Hotel, Manchester, on March 24, at 2.30 p.m., under the Presidency of Mr. H. Singleton, of Huddersfield.

The annual lunch will be held on the same day at 1 p.m.

Wales & Monmouthshire Association

The 34th Annual Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers will be held on Thursday, May 25, at Newport (Mon.) under the Presidency of Mr. J. H. Canning, O.B.E., J.P., Director, Engineer, and Manager of the Newport (Mon.) Gas Company.

New Showrooms at Penge for South Suburban Consumers

The widening and modernization of Penge High Street has brought with it the erection of a fine, sweeping range of up-to-date shops, and the South Suburban Gas Company, who previously had no showrooms in this district, have taken the opportunity of opening attractive new premises in this block. This is the seventeenth showroom in the Company's area of supply.

A SHOWROOM such as this presents a new approach in that the premises form one of a group of shops under the same roof and that reliance has thus to be placed upon the shop-front and such of the interior as can be seen from the pavement for the appeal to the public, rather than upon any distinctive treatment of the building as a whole.

The Company have certainly achieved their object in this respect, for there is no doubt that the gas showroom stands out from its neighbours—not blatantly, but with a definite air of distinction—its clean modern lines, bronze window and door frames, and straightforward bold lettering characterizing the traditions of the Company, and, indeed, of the Industry generally.

The window is of the "open" type, though provision has been made for special displays as and when required. Under normal conditions, however, a clear and uninterrupted view of the whole interior can be obtained from the street, in which, of course, lies much of the showroom's appeal. Above the window the Company's name is executed in hollow block letters, the centre portions of which are of frosted glass through which a concealed row of lights above the window, behind, pick out the name after dark, as well as serving to illuminate the appliances inside the window. A pleasing little second floor balcony with twin flag-staffs help to break what might otherwise become a rather monotonous frontage.

The Interior.

On entering the showroom one is immediately struck by the somewhat unusual but extremely pleasing decoration scheme. There is a delightful contrast of bold colours which at the same time harmonize amicably with each other. The walls are finished in a blue-green mural Rexine, the skirting and picture rail being painted black, with a deep white frieze above. A nigger brown carpet picked out with a white pattern covers the light oak block floor. The cashier's desk with its curved counter is also of light oak, with black ebony mouldings, while the desks and chairs are of similar wood, the latter having blue upholstery. The woodwork of the staircase and the rear door is finished in royal blue.

Over the cashier's desk is a clock at the end of whose minute hand is a little figure of Mr. Therm. Specially designed chromium lighting fittings add distinction to the interior, as also does the striking water heating display, where the different appliances are set against a background of black glass with Travertine marble around the drainage trough. Concealed lighting illuminates the whole setting from above.

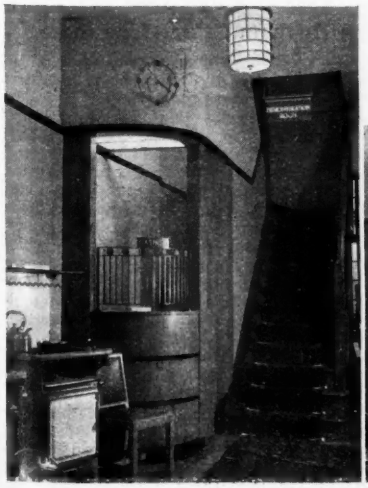
Demonstration Room.

The staircase leading to the first and second floors has the same pattern carpet as the showroom, while a light oak handrail sets off the blue paintwork.

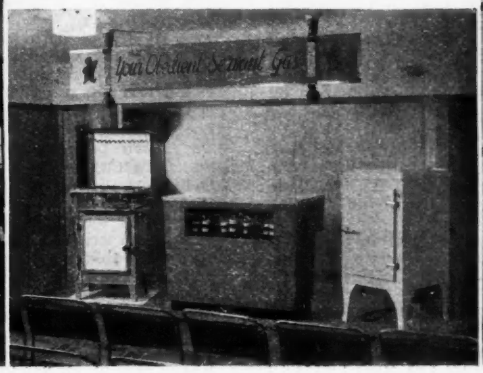
A completely different colour scheme is embodied in the demonstration room, which occupies the greater part of the first floor. Here we have a silver-grey wall treatment relieved by a small amount of bright red paintwork to match the seats of the chromium-plated nesting chairs. The doors are of light oak, which treatment is extended to the platform; the latter is illuminated by a strip of amber lights behind the slogan board seen in one of the accompanying photographs. The curtains adhere to the general decoration scheme, and the demonstration room as a whole provides a splendid example of the effects that can be secured in a small space; it seats approximately fifty people, and, needless to say, on the occasion of our visit to the new showrooms, the demonstrator had a "full house." Behind the platform is a small kitchen, which also serves as the demonstrator's office.

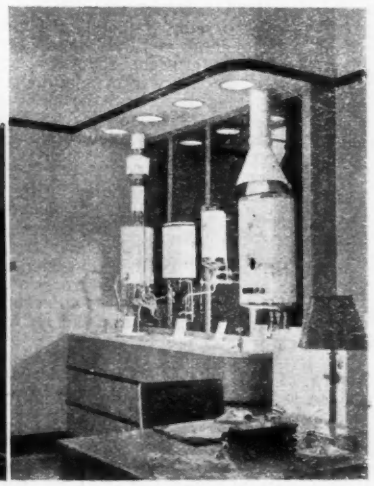
On the top floor are a store-room and comfortable rest rooms for the staff. There is also a further store-room behind the staircase on the ground floor.

In the Penge premises we see a small showroom which definitely escapes any suggestion of being cramped; and we see a well-balanced blend of dignity and simplicity enhanced by a bright and cheerful colour scheme. The whole effect of the new showroom is extremely pleasing and should do much to increase the prestige of the South Suburban Company in a district which has not previously enjoyed the facilities offered by an up-to-date service centre. Even though the premises have only been open a few weeks consumers are making full use of them, and the resulting business is gratifying.



Left.—A corner of the Showroom, showing cashier's counter and staircase. *Below.*—The platform in the Demonstration Room. *Right.*—The striking water heating display.





Newcastle Coal Prices Enquiry

On March 6, Mr. *Ridley* corrected the figure of £12,134 given at the previous hearing as representing the cost to the Newcastle Gas Company by reason of the extra 1s. per ton complained of. He said that under the contracts with large consumers in which there was a coal clause some portion of the extra cost would come back to the Company, and taking this into account the estimated actual amount of the extra cost to be borne by the Company would be £11,477.

The cross-examination of Mr. Ridley on behalf of the Durham Executive Board of the Durham District (Coal Mines) Scheme—who are the respondents in the appeal—then proceeded.

Mr. EVERSHED, K.C., first put questions with regard to the National Gas Council, and said that, stripped of all embellishment, this enquiry was in respect of an ordinary business deal in which the National Gas Council was trying to get a reduction, if possible, in the price of the raw material used by the Newcastle Company.

Mr. *Ridley* said he was on the Executive of the National Gas Council and agreed that this enquiry had the support of the National Gas Council.

Asked as to whether he thought there was anything improper or uneconomic in the price which the London gas companies were being asked to pay, Mr. Ridley said he was not concerned with that, but his Company would be quite prepared to pay the price which the London gas companies were paying for Durham coal.

Mr. EVERSHED asked Mr. Ridley to state quite specifically what it was he was complaining about.

Mr. *Ridley* said it was simply that his Company was being asked to pay 1s. per ton more pithead price for the same coal as was supplied to the London companies.

Mr. EVERSHED pointed out that under the Act or under the conditions governing the Selling Schemes, the complaint must be that some act or omission on the part of the Sales Committee was unfair and inequitable and not in the public interest.

Mr. *Ridley* replied that he complained it was unfair and inequitable that the London companies should be asked to pay 1s. less per ton pithead price for the same coal as that supplied to the Newcastle Company. For that reason he contended the price was too high in his case, having regard to the fact that the same class of coal was being supplied elsewhere to the Gas Industry at 1s. per ton less.

Mr. EVERSHED reminded the Court that the prices obtained by the Durham Sales Committee must be sufficient to pay the miners a wage amounting to 70% above the basic wage out of the 87½ of the profits allocated under the Selling Schemes to wages, and his suggestion was that the prices which had been fixed to give an overall price of 17s. 4d. per ton would not produce enough to pay this amount to the miners.

Continuing, Mr. Evershed put a number of questions on the fairness or otherwise of differentiation between one consumer and another, and put it to witness that although in the Gas Industry there was a differentiation in price between different consumers, apparently the Newcastle Gas Company objected to the Durham Coal Sales Committee having the same freedom of action.

Mr. *Ridley* replied that there was no differentiation in price in the Gas Industry as between consumers taking gas under the same conditions, but the Durham Coal Sales Committee was making a differentiation as between consumers in the Gas Industry who were under the same conditions.

Mr. EVERSHED retorted that in the Gas Industry there was a reduction for quantity and the London gas companies took a very much larger quantity of coal than the Newcastle Company.

Mr. *Ridley's* answer was that, although the London gas companies were taking more than the Newcastle Company, coal was being supplied at 1s. per ton less (pithead price) to gas undertakings in other parts in the South and elsewhere by the Durham Committee although these undertakings took less coal than the Newcastle Company.

Mr. EVERSHED then commented on the fact that an instruction had been sent to all the Sales Committees as to co-ordination of prices and collaboration, and that the prices fixed by the Durham Committee had been arrived at as a result.

Mr. J. H. THORPE, for the Newcastle Company, remarked that if it was to be said that some instruction of this nature was given in this particular case as regards co-ordination between the Midland Amalgamated District and the Durham District, he was going to ask for strict proof.

Mr. EVERSHED replied that the position was that in the early summer of 1938, the Midland District was also pressing for the London gas coal order, and the Sales Committee in Durham had been instructed that they should co-ordinate, as far as possible, the f.o.b., prices of Durham coal with the delivery prices of rail-born Midland coal.

Mr. *Ridley* said he knew that the price quoted to the London gas companies had also been quoted in Bristol and other places.

Mr. EVERSHED said the price quoted to the Newcastle Company was the same as had been quoted to all users in Durham.

In answer to the CHAIRMAN,

Mr. *Ridley* said that the average price received in 1938 by the Newcastle Company for all its gas was 5·871d. per therm, but the price received from domestic consumers, who formed the largest proportion, was an average of 7·02d. per therm. The amount involved in the extra 1s. per ton on coal now asked for represented 0·1d. per therm.

Mr. EVERSHED said that even assuming the whole of the extra was placed upon the consumer, it was not a very considerable amount; but having regard to the highly gratifying report of the Newcastle Company last year he suggested there was no reason why the whole of it should be passed on to the consumer. If the Company bore the whole of the additional cost it certainly would not be brought to its knees. It would be idle to suggest that the extra £11,477, if borne by the Company, would in any way endanger it.

Mr. *Ridley* said he could not agree to that. In the first place, £11,477 was a large sum of money, and with the new work now in progress it might be necessary to increase the price of gas. All experience went to show that an increase in the price of gas tended to stop progress. It held back increased sales especially when there were as many slot-meter consumers as he had.

Mr. J. H. THORPE re-examined Mr. Ridley, who said the Newcastle Company considered that a principle was at stake in this matter and that if the principle was admitted on the first occasion this discrimination had been applied they were apprehensive that it might be continued from year to year.

Mr. THORPE, in his further questions, emphasized the point that Parliament had fixed the basic price of the Newcastle Company some time ago having considered the local circumstances, in which was included the supply of coal and proximity to the coalfields. He also stressed the relation of price to dividend in the Gas Industry and the influence which an increase in the cost of coal amounting to £11,477 would have.

Mr. *Ridley* was then asked questions relating to the suggestion by Mr. Evershed that it was a sound business proposition to allow a reduction in price for a quantity, and said that the Croydon Gas-Works took 195,000 tons of Durham coal in 1937, the Lea Bridge Gas-Works took 61,000 tons, and the Hornsey Gas-Works 57,000 tons, all much smaller quantities than the Newcastle Company took, yet they were quoted 1s. per ton less than the Newcastle Company for the same class of coal. Durham coal was also being sent to the Bristol Channel at the same prices as were charged to the London companies. The point was also emphasized, in relation to the law of supply and demand, that the Newcastle Company could not buy its coal outside Durham, and he concluded by contending that the pithead prices of Durham coal should be the same for all engaged in the same Industry.

Mr. *J. E. White*, Chief Technical Adviser (Utilization), to the Newcastle Company, gave evidence with regard to the relative merits and efficiencies of various classes of fuel. He said he was now negotiating for a consumption of roughly 1,000 million cu.ft. of gas per annum for a new industry, and he would have the greatest difficulty in getting that business even at present prices in competition with oil.

This concluded the case for the Company.

The Case for the Durham Sales Committee.

Mr. EVERSHED, K.C., then briefly addressed the Tribunal on behalf of the Durham Executive Board of the Durham District (Coal Mines) Scheme, in support of the prices fixed by the Durham Sales Committee. He said that the point for the Tribunal to bear in mind was that these Selling Schemes, created as they were by Act of Parliament, must be workable. It was necessary to protect not only the consumer but also the Executive Board, and the result of this enquiry would depend upon the meaning which was given to the expression "unfair or inequitable"; the vital question to be decided was what was meant by that expression. The Act said there must be an act or omission which was unfair or inequitable, and the Tribunal was asked to say that the fixing of these pithead prices was unfair or inequitable. In his view, these prices must be proved to be unfair or inequitable at the time they were fixed. To prove that, however, it must be shown that there was something about the action of those who fixed these prices which was open to the criticism that it was unconscionable or over-reaching. Merely to say, as the appellants had, that the prices fixed worked a little hardly on a particular consumer could not be regarded as sufficient to prove that they were unfair or inequitable.

Continuing, Mr. Evershed said that what Mr. Hornsby, the Chairman of the Durham Committee, set out to do was to get an increase of 5s. per ton on the 1935 summer prices, and there

had been an instruction that where there was competition between seaborne and railborne coal, an attempt must be made to correlate the prices. Mr. Hornsby had come to the conclusion that if the extra 4s. 3d. which had been added to the price in 1937 could be retained as against the London gas companies it would work out about the same, as his information was that the cost of freight would increase by 1s. per ton in 1938-39. Then Mr. Hornsby found that the Midland Amalgamated District was reducing its price by 6d. and it was essential to the Durham coal industry that the series of contracts for coal to be supplied to the London gas companies should be retained. Therefore, Mr. Hornsby thought it was open to him to make some reduction to retain that business. The general aim was an increase of 5s. per ton over the 1935 prices and the fact that the London companies and one or two other places outside London obtained their coal at a lower pithead price than the Newcastle Company did not, in his view, impose hardship on the Newcastle Company, because in the end the Newcastle Company obtained its coal, delivered, at a lower price than these other undertakings. The reduction to the other undertakings was made in order to retain the business.

The CHAIRMAN said he was a little anxious about the distinction between "unfair" and "inequitable."

Mr. EVERSHED replied that he would deal with that later, but the point was that the selling schemes were intended to increase prices, and it could not, therefore, be said to be unfair when the price was increased.

The CHAIRMAN said that was true, but consideration must be given to the point as regards unfair discrimination.

Mr. *Thomas Hornsby*, Chairman of the Durham Sales Committee, then gave evidence. He said that both Durham and Midland coals were suitable for the London gas market and therefore were liable to come into competition. In such circumstances there was co-ordination, and the Durham Committee in this particular case had co-ordinated with the Midland Committee with the object of trying to retain for each District its share of the trade.

The enquiry was then adjourned until Saturday, March 18.

Alleged Maladministration at Southport

The hearing was resumed on March 3, at the Southport Police Court, of summonses against Mr. J. H. Clegg, the Southport Corporation Gas Engineer, and Mr. W. E. Plevin, the Deputy Engineer, alleging conspiracy with chemists at the gas-works in illegal practices in the administration of the Gas Undertaking. A report of the hearing on Feb. 22 was published in the "JOURNAL" for March 1, p. 572.

Mr. Robert Crichton, Counsel for Plevin, resumed his cross-examination of Illingworth, the Chief Chemist.

Counsel suggested to witness that between September, 1935, and October, 1936, no record book was kept of tests.

Illingworth: I resent that suggestion; it is not true.

Counsel: Then where is the book?

Illingworth: I do not know.

Witness agreed that there was inefficiency and irregularity in making the tests. He said that records of tests taken between October, 1936, and June, 1937, were made by the chemists to Plevin on pieces of paper.

Mr. Crichton read a note initialled by Plevin. This was written on Jan. 20, 1938, to the technical staff, and stated that in order to obviate Plevin receiving reports on pieces of paper of various shapes and sizes, reports should be made on pink sheets provided.

Illingworth said he did not agree that this note was to put a stop to the practice of reporting on odd pieces of paper. He alleged that the note had been written for the purposes of the present case.

Mr. Crichton: I want to know how you dare to make a suggestion that the note was typed specifically for this case.—Because it is my firm opinion. I have no proof of it.

Counsel: Have you any animosity against Mr. Plevin?

Illingworth: That is not so. The relationship between Mr. Plevin and myself until December, 1937, has been extremely good.

Counsel: It is manifestly impossible that the letter should have been typed for the purposes of this case, isn't it?—I do not see why.

Illingworth, replying to the Chairman (Mr. H. Brodrick), said that on Jan. 20, 1938, he had not told Plevin he had been to the Town Clerk, nor, as far as he knew, had anyone else.

Mr. Crichton: Before Mr. Plevin came, no attempt had been made for some years to maintain the quality of gas and its declared calorific value?—Well, the gas certainly had not been delivered at its declared calorific value.

I suggest no attempt had been made to produce gas at the declared calorific value?—That I don't know.

Can you remember any attempt being made before Mr. Plevin came, when you were the senior technical assistant, to produce gas at the declared calorific value?—I cannot remember any attempts to do so during my time at Crowlands.

Special Holder.

Illingworth said that when Plevin came to the works he (witness) told him that gas was not being produced at the declared calorific value. He also told him that a special holder had been used for some years, and explained the whole business of the special holder. During his term as acting deputy gas engineer, the special holder had been constantly and improperly used, and he also imagined that the Hyde meter was short of water.

Asked if Plevin immediately deprecated the practices revealed to him, witness said he had no recollection of any comment from Plevin.

Mr. Crichton: Did you tell Mr. Plevin that if the tests were not satisfactory the chemists simply added B.Th.U. in the book to bring it up to the proper figure?—I know nothing about this. This is new to me.

Illingworth added that to his recollection Plevin did not tell him that the position was most unsatisfactory and that proper tests must be made in future.

Mr. Crichton: Were any instructions given to the chemists with regard to maintaining calorific value?—There may have been, but I cannot remember an incident.

Mr. Crichton recalled a letter written by Clegg to Plevin dated Jan. 5, 1937, which stated that a large drop in calorific value needed some explanation in writing. He (Clegg) asked for an explanation as soon as possible.

Witness said he received this note from Plevin, but he could not recollect replying to the note. As the note was received by him, he thought he must have replied to it. Otherwise, Plevin would have demanded an explanation.

Mr. Crichton then produced a letter written by witness to Clegg, dated Jan. 6, 1937. In this, Illingworth said that having been made responsible for the purification plant, and finding that all seven boxes were not free from all traces of sulphuretted hydrogen, it had been necessary to resort to drastic methods. (The letter then went into technical details, and concluded by saying that every effort had been made to maintain the calorific value.)

Counsel: Was it the practice at Crowlands, if the calorific value was to be raised, to raise it by shutting off the admission of air to the purifiers?—I would rather not answer that question, because I did not use these methods.

Purifiers Stated to be inadequate.

Illingworth agreed that on the advent of Plevin, four of the seven purifier boxes were in a very dilapidated condition. Their size was not adequate to the daily make that was being passed through them. He knew in January, 1935, Clegg had made a report to the Gas Committee on the subject, and that later in 1935 he had made another report of cracks in the purifying plant. In October and December there were reports on the foremen's log sheets regarding purification, showing that on Oct. 26, 1935, H_2S was passing into supply for the town, as it was also on Dec. 2 and 4. It was not true that towards the end of 1937 a number of purification boxes became prematurely fouled. Records showed that on Dec. 8, 1937, there were two clean boxes and on Dec. 9 there was only one, due to the plant being under capacity. In his opinion, it would take some considerable time for a newly-filled box to become foul again with 3 million cu.ft. of gas passing through per day, if the air supply were shut off. It would certainly not happen in a day.

On Dec. 8, 1936, according to records, there were five clean purifying boxes, and on Dec. 10 there was a record of a trace of H_2S passing into the last box but not passing out into supply. They were all told by Plevin to keep air going through the purifiers.

A note was addressed to the technical staff on Feb. 12, 1937, from Plevin, saying it was impossible to keep the purifiers in reasonable condition if the admission of air for revivification was stopped entirely.

Illingworth said that on one occasion, to his knowledge, negligence in the procedure at the rotation of boxes resulted in gas passing to supply without being properly purified.

Plevin did not know of the use of the dots denoting on the records when H_2S was in the supply, and witness did not know prior to Dec. 30, 1937, when it came to his knowledge.

Referring to the occasion when it was alleged that the globe was taken from the H_2S testing apparatus, witness said it was true that on one occasion the gas examiner could have tested for H_2S without the globe. In the Notification of the Gas Referees it was laid down that in the event of an emergency the examiner should proceed with his test with the best available alternative apparatus satisfactory to himself. The examiner's report for that particular day showed no trace of H_2S.

Condition of the Plant.

Mr. Blackledge (for Mr. Clegg) then opened his cross-examination, and in reply to him, Illingworth said the present average output of gas was 3 million cu.ft. per day. He would say there was a larger output in 1937 than in 1934. When Clegg came in 1934 the plant was in a poor condition. The capacity of the purification plant in 1934 would be about 2,300,000 cu.ft. of gas per day.

By 1937, continued witness, the output had grown so that approximately 700,000 more cu.ft. of gas passed through the purifiers each day than they could efficiently deal with. Clegg had told him when he came that he was going to have difficulty in getting money for new plant. Witness knew the net profit of the undertaking was very low when Clegg came, and therefore it would be difficult to pay for new plant out of income.

Before Clegg arrived there had been fairly consistently low calorific value.

Illingworth was handed by Mr. Blackledge the foremen's carbonizing book covering the period May 25, 1927, to Dec. 12, 1927.

Witness, dealing with an entry on Sept. 3-4, 1927, addressed to foremen, read as follows: "Gas examiner will be testing on Sunday. Have two holders filled with 480 B.Th.U. gas by 9 a.m. on Sunday. Work on oil up to eight gallons if you cannot increase holder's calorific value." This, alleged witness, was initialled by Mr. Cook, who was at that time deputy-engineer. Someone had averaged the calorific value tests at 459 B.Th.U. He (witness) was not sure whether those figures referred to "make" gas or "town" gas. There was a second entry, stating: "Gas in No. 1 holder, 480 B.Th.U." This was not signed, but the handwriting was different from that of Mr. Cook's. This entry, said witness, would appear to be a response to Mr. Cook's request.

Mr. Shawcross said that in opening the case he expressly stated that it was not alleged against either Clegg or Plevin that they had initiated the alleged practice in regard to the special holder. His submission was that it was no defence that the alleged practice should have been continued by defendants.

Mr. Blackledge said his defence was that his client took over a staff which had been trained in deception, either by themselves or by the defendants' predecessors. Mr. Clegg was entitled to assume that the staff was honest. He acted on that basis, and assumed that at any rate the gas examiner had the intelligence of a child of twelve. In the circumstances, he was wrong, but that was not a criminal offence.

Illingworth agreed with Mr. Blackledge that it was quite clear that up to the end of June, 1928, the special holder deceptions were continuing. In addition, there were entries with regard to dates when the gas examiner was coming on other folios.

Mr. Blackledge: Are you prepared to agree that that system of deception continued right through until 1937?—Yes.

Witness agreed that prior to Clegg's appointment, the calorific value had been consistently low.

Mr. Blackledge: At the time Mr. Clegg took over, the staff were already practised in this particular type of deception?—Yes.

When Mr. Jacks left, you became acting deputy?—Yes.

As acting deputy, you would be in direct touch with Mr. Clegg?—Yes.

Am I right in thinking that the first time you ever discussed with him any deceptions was Dec. 30, 1937?—Yes.

Until that date, am I right in thinking that Mr. Clegg had never been told by you of any case of the special holder?—No, he had not.

Until then, witness continued, he had never told Mr. Clegg of any faking of instruments, such as a calorimeter. In fact, witness never told Mr. Clegg at all either about the special holder or the calorimeter. He first told Mr. Clegg on Dec. 30, 1937, of the faking of the purifying book by the omission of entries showing the presence of H_2S passing through the holders.

Mr. Blackledge: As soon as you told him about H_2S entries being omitted, did he immediately order correct entries to be put in, and the deception to be abandoned?—He did.

Was he ever told by anybody else, in your presence, of these irregularities?—No.

How many months were you the deputy?—I was acting-deputy for about four months in 1936.

Am I right in thinking that in the whole of the time you were acting-deputy you never discussed any of these deceptions with the chief engineer?—No.

Witness said that Clegg was the chief engineer, working at the office in Eastbank Street in the ordinary way. The deputy engineer looked after the Gas-Works. The chief engineer had all kinds of other duties, and had other officials under him. The chief engineer had to attend meetings of the Corporation.

Mr. Blackledge: Would it be fair to say that Mr. Clegg was the co-ordinating manager, co-ordinating all the departments?—I do not see anything wrong with that.

Alleged Deceptions Concealed.

Replying to a further question, witness said the Gas-Works were about two miles from the offices in Eastbank Street.

At the time you were deputy, will you accept that there were thirty-one entries in the carbonizing sheets with reference to the preparation of the special holder?—Yes.

To deceive the gas examiner?—Yes.

Entrjes, in the main, made with your knowledge, I suppose?—Yes.

Yet you did not report the system of deception to Mr. Clegg at that time?—No.

You did not report the deception because you were afraid of what Mr. Clegg might do if you did?—I was.

Mr. Blackledge: While you were acting-deputy, did Mr. Clegg ever order the slightest deception of any kind?—No.

Nor afterwards, as far as you know, at any time that matters?—No.

As far as you could see, did he ever show the slightest signs of being a conspirator?—No.

Witness was then questioned about technical matters in connexion with the purifying boxes. He said that shortly after Clegg came to the works he asked for regular analyses of the gas made. The chemists did not always do analytical tests of the gas because the apparatus was surrounded by stores and difficult of access. At the period in question, alterations were taking place at the stores.

After further technical questions, Mr. Blackledge asked, "Talking about the gas examiner, I suppose you will agree that in the ordinary course you would expect a chief gas engineer to be able to rely on a gas examiner's reports as being reasonably accurate?

Illingworth: Certainly.

Mr. Blackledge: Don't you think you were rather going over the chief's head going to the Town Clerk?—No; because we had already mentioned some of these things that were happening.

Going to the Town Clerk on Jan. 19 was a deliberate step to go over Mr. Clegg's head, was it not?—No; we had had advice to do that from two members of the Council, one a member of the Gas Committee.

What were their names?—Need I give those?

Mr. Blackledge: I am going to suggest an indirect motive, thus causing Mr. Clegg to be blamed for this matter when he is quite innocent.

Mr. Blackledge ultimately decided to defer the question.

Mr. Blackledge: What I am suggesting is that this was a conspiracy on the part of the chemists, with whom you were indirectly connected as a technician, to get rid of Mr. Clegg because he had abolished the deceptions and was going to make carelessness and negligence impossible in the future. I suggest they went to the Town Clerk over Mr. Clegg's head to make allegations against Mr. Clegg.

Witness replied that, so far as he was concerned, the other chemists only went to the Town Clerk to complain about the conditions and not to make a specific complaint against Mr. Clegg.

Continuing to reply to Mr. Blackledge, witness agreed that almost immediately after Clegg came to the job in 1934 he had enforced rules for better keeping of the purifier boxes.

Mr. Blackledge: Every time Mr. Clegg has come into the picture he has been ordering full and correct entries in records, so far as you are concerned?

Witness: I can't quite agree with that, but he was making changes.

Mr. Blackledge repeated that every time Mr. Clegg had appeared in those court proceedings it had been in connexion with the ordering of full and correct entries. To this witness agreed.

Adjournments.

The case will be resumed next Wednesday, at 11 a.m., and will be continued after that on Thursday, then on Monday, March 20, Saturday, March 25, and Monday, March 27.

After the Fair - - - - -

Both during the run of the Fair and afterwards we took every opportunity that offered of discussing with exhibitors their reactions to this year's event in particular, and in general the value to them as individuals and to the Gas Industry as a whole of participation. On the first point there was quite a remarkable consensus of opinion that this was the best year ever. This view was supported even by many whom we know to be most strongly opposed in general to any participation.

AS to the expression of individual preferences for a continuation or otherwise of the Gas Section, there was a natural reluctance in nearly every case to allow such expression to be identified with the name of the firm. Opinions can, however, be broadly classified under the headings of those who said:

(1) We have taken orders, but none that we should not have taken if we had not exhibited.
(2) We came here because our competitors came, and regard it otherwise as a useless expense.
(3) We should favour showing every second or third year if such an arrangement was practicable, but are doubtful as to the value of a separate gas exhibition in London or provincial towns.
(4) We like the Fair, and should come here whether there was a Gas Section or not.

No attempt has been made to place the above views in any order of popularity; they are a general summary of those expressed to us in various quarters. From the following statements made by individual firms it will be realized that many were eminently satisfied with results.

Alder & Mackay, Ltd.

A considerable amount of interest centred round their new prepayment tariff meter attachment which was exhibited for the first time. In this an ingenious arrangement behind the rangeplate automatically increases the delivery per coin after the quantity at full rate has been paid up. Delivery per coin can be extended by 50%, 75%, or 100% of the original setting, and the initial quantity can be varied to suit individual ideas. The "Delayed Selector" Optional was shown in an original manner. The complete meter stood in a brightly lit box making visible the whole internal construction—an X-ray effect achieved by an ingenious arrangement of mirrors and screens. To meter inspectors and laboratory chiefs the 10 cu.ft. standard gas test holder was also a great attraction. In view of the present interest in A.R.P., the safety service stopcock also attracted a number of enquiries. In this patent cock a spring-loaded plug is held from its seat by a soldered link which breaks at 155° F., automatically cutting off the supply in the event of fire.

Barker & Turner, Ltd.

Were especially fortunate on this occasion in having a surprise item for their display. The well-kept secret was the new model 38 "Bar-Spot" washing machine, with the new two-speed cantilever wringer. Not only were many direct orders taken on the stand, but a number of serious enquiries were referred to the gas undertakings in the areas from which the enquiries came. The application of power for the wringer has resulted in a real labour-saving job, and the machine did not provoke a single adverse criticism.

Bratt Colbran, Ltd.

Report considerably greater interest than in previous years, this, however, being largely accounted for by the fact that their contact with undertakings throughout the country is becoming increasingly substantial. Enquiries were equally divided between overhead radiant heaters and domestic appliances. The needs of the Factory Acts have considerably assisted the sale of radiant heaters, while their almost universal range of application provides gas undertakings with a market which is initially fairly easy to obtain and which supplies substantial increases in gas loads. As regards the foreign market for these appliances, the Dutch Agency is now being negotiated, while approach has been made by a firm for the agency in Belgium. With regard to domestic appliances, the new "Mortimer" heater is considered extremely attractive, the new type constituting a clean-up of design of the original. The "Portette" portable fire is a new production in stamped steel, offered at reasonably low prices. It is expected to assist considerably in meeting the ever-widening demand for portable appliances. The "Rayello" No. 999 plaque fire dispenses with the need for a surround and offers the additional facility of Messrs. Bratt Colbran's economy brasswork, with varying positive turndown positions. The "Wexford" is a flush-fitting fire in Staybrite steel offered at a price considerably lower than that of any Staybrite steel fire previously produced in the "Portcullis" range.

British Fittings Company (Hendon), Ltd.

The centre of interest here was a display of fittings treated by the new "leadization" process, substantially increasing the anti-corrosive properties. Among outstanding orders was reported a substantial one for malleable fittings for Lithuania.

British Thermostat Company.

Were highly satisfied with results. There appeared to be fewer idle enquiries of the "How does a thermostat work?" variety, but more genuine ones likely to lead to business.

British Vacuum Cleaner and Engineering Company.

Interest in British Vacuum Cleaner Company's machines for use on gas-works was greater than ever before, and a considerable number of problems were discussed on the stand.

Cannon Iron Foundries, Ltd.

Reported "Business fair," but thought that fewer engineers had visited the Fair this year than usual. On the Cannon stand the "Henley" cooker and the "Wallflower" heating unit were both exhibits of very considerable interest.

Chaseside Engineering Company.

More than the normal number of enquiries was received, particularly from the gas side. It was evident from the tone of these that, with the increased cost of coal, the Gas Industry was looking round for economies in coal handling, and mechanical plant of the kind supplied by the Company was coming in for increased attention.

Cochran (Annan), Ltd.

In addition to providing a boiler for the use of the Fair authorities, this Company had an attractive stand at which gas boilers for hot water and steam were the subject of numerous enquiries. Chief interest was in "Sinuflo" tube and boilers.

Economic Gas Boiler Company, Ltd.

All their models were very well received, particularly the one fitted with the latest type "Acme" wringer. Several new accounts had been opened during the Fair and business had been about normal.

Emscote Foundry Company, Ltd.

Had taken the usual orders. Their principal exhibit was the "Certes" gas cooker which, they stated, had created a large amount of interest on account of its price. They are of opinion that the publicity value of the Gas Section is considerable.

Ether, Ltd.

The best Fair so far from a business point of view. A number of new contacts had been made and demonstration had proved of especial value. To this firm the Fair is of great value in that they see people who are commercially interested and whom they would not otherwise meet.

Evered & Co., Ltd.

Had had more enquiries this year than on previous occasions, particularly for gas lighting fittings from gas companies, and they are of opinion that their gas lighting connexion may show some increase in the near future. The principal exhibit was their gas carburettor which they are now manufacturing in smaller sizes, and an oven control valve for meticulous adjustment of gas supply.

Ewart & Son, Ltd.

Orders and enquiries were very heavy for the "Empire" multipoint water heater, which was specially featured at the stand.

Messrs. Ewart expect that their works will soon be running to capacity to keep pace with the demand. Other products such as the new "Kula" refrigerator and the No. 30 series water heaters were also subject to many orders and enquiries. In Messrs. Ewart's opinion the Gas Section is an essential part of the B.I.F. and serves a very useful purpose in attracting overseas buyers, and also in giving the supply side of the Industry a good chance of keeping abreast of manufacturing progress.

Falk, Stadelmann & Co., Ltd.

The centre of interest here was the "Streamline Newhome" cooker, which, while similar to other fashionable cookers as regards general appearance, embodies certain specialities such as the well-known "Duex" circular grill-boil burner. Further it incorporates the new "Streamline" one-action cooker lighter, actuated by a flint which is a positive action. Wherever this has been demonstrated, showing to what extent it can even be subjected to very rough usage, it has evoked considerable interest, especially owing to the extraordinary simplicity of replacing the flint. This feature eliminates all maintenance expenses, any consumer, however inexpert, being able to fit a new flint by merely raising a small lever and pushing it in. In this fitment Messrs. Falk, Stadelmann feel that they have now produced a really satisfactory lighter.

General Gas Appliances, Ltd.

Report that the "CR" fire and the "Portans" heater had created considerable interest among gas engineers.

George Glover & Co., Ltd.

Brought to the notice of the Industry for the first time their time tariff meter which ensures the prepayment of the service charge and which permits the consumer to be on cheap gas all the time. This meter created great interest and the staff on the stand were continually working at high pressure demonstrating to engineers from all over the country the facilities the meter offers.

On examining their records after the Fair, Messrs. George Glover state that it is curious to note that the question of two-part tariff seems to be much more in the mind of engineers in the North of England than in the South, but it is felt that a clearer understanding of the problems involved is general throughout the Industry. It is also encouraging to report that the younger engineers are keenly alive to the technical problems involved in the measurement of gas, and the knowledge which they have of meter construction and their desire to discuss further developments augurs well for the future.

Girdlestone, Ltd.

Mr. T. C. Riggs stated that more enquiries were received in the first week than in the whole period of the Fair last year. Several gas engineers discussed their pumping problems, and a number of gas-works orders were booked.

Glover & Main, Ltd.

Messrs. Thomas Glover reported good business and a considerable amount of interest in their chief exhibits of the working models of 30,000 and 3,000 cu.ft. meters, and also the volumetric meter and gas clock.

Messrs. R. & A. Main had also had the usual orders, the exhibit of principal interest being their compressed steel cooker.

Gittings & Hills, Ltd.

Secured a number of orders and made new contacts. General results considered satisfactory.

George Wilson Gas Meters, Ltd.

Reported very good business indeed and regarded this year as better than any of its predecessors. Considerable interest had been taken in their "Adhill" cut-off valve which operates automatically in fire emergency. They were also showing a special two-part tariff attachment capable of adjustment for insertion of different unit values. Messrs. George Wilson are very impressed with the opportunities found at the Fair of demonstrating their meters and adjustments to the Industry generally.

Grosvenor Utilities and Associated Companies.

The new "Ufix" boiler met with an unqualified reception and a considerable number of gas engineers arranged to have boilers installed for test purposes. The appliance is made in two sizes, one with a capacity of 2½ pints of boiling water per minute, and one of 4 pints per minute. Everyone who examined the exhibits was impressed with the great advance they revealed. Another arresting feature on the stand was the 10,000th cooker renovated by the firm by means of vitreous enamel. The cooker was displayed beside an identical cooker that had not been renovated, and considering the contrast one wondered why anyone puts up with an old "black" cooker in these days. Business for this firm was well up to expectations.

Hancock & Co. (Engineers), Ltd.

The Company received an order for a very large oxy-coal gas cutting machine with a cutting area of 22 ft. by 5 ft. for a well-known firm of millwrights and engineers in England. Several orders were received for smaller models, and interest was taken by gas engineers in the compressor activities of the associated Company, H.E.C. Compressors and Engines, Ltd.

Hilmor, Ltd.

Welcome the B.I.F. as an opportunity to meet customers and potential customers further afield. Recalling the depressing atmosphere at the time of the building exhibition in London in September, they regarded the improved international outlook as an important factor in the success of the Fair. They did well during the Fair, and look for substantially increased business in tube bending machines with the extended use of copper in the Gas Industry.

Horstmann Gear Company, Ltd.

Reported that they had taken more orders this year than last, but most of the orders at the Fair are from standing buyers and can hardly be regarded as new business. The Fair offers, however, a useful opportunity for demonstration. Calls had been received from buyers from Poland, Belgium, and Holland; a point of interest from Poland being that several travellers from that country who have hitherto held German agencies are desirous of dropping these in favour of British agencies, if they can obtain them.

Hurry Water Heater Company.

Reported better business this year than ever before. Great interest was taken in their model sump heater for use in garages, the heating unit being supplied by a small gas jet and the whole being constructed on the Davy lamp principle. Their space heaters had also attracted considerable attention. Their aquariums in which were exhibited tropical fish, axolotls, and also two baby alligators, proved the customary draw, and numbers of gas showrooms are installing these for this purpose, as are also cafés and picture houses. Much favourable publicity is obtained by this firm by exhibiting at the Fair.

Ideal Water Softeners, Ltd.

Found the Fair an excellent opportunity for meeting gas engineers, not only on the stand but throughout the section. Many of them were found to be heartily in agreement with the principle of linking softening with heating, and the firm looks for big developments when that principle is more firmly established.

Donald Macpherson & Co., Ltd.

A highly satisfactory crop of enquiries from the Gas Industry was reported here, chief interest being shown in liquid wall glaze resistant to all the conditions encountered at the works, A.R.P. black which effectively blacks out glazed windows and stack lines at one coat, pipe-line colour paints according to B.S.S. and specially prepared to withstand gas-works atmospheres, and instructive specimens of 15-months exposure tests made in the Manchester District.

Maxol Heaters, Ltd.

State that unquestionably the two outstanding appliances among a large selection of heaters displayed by them were the pressure café set and the range of circulators. A large number of enquiries were received for these and many solid orders placed by various gas departments. They are convinced that in these two products they have something a little different, and indications of a successful season are numerous.

Metropolitan Gas Meters, Ltd.

Also reported a fair amount of business. The principal exhibit was a demonstration of rental collector attachments suitable for use with any make of meter.

Niagara Screens, Ltd.

That gas men are showing a revived interest in vibratory screens was the impression received at this stand. Although the only really new exhibit was a screen of the totally enclosed type, there were more enquiries than usual, including several from overseas.

National Gas Water Heater Company, Ltd.

Increased interest in water heating was reported here, where the chief new item was the "National" bath water heater, equipped with a volume gas governor, safety pilot, and automatic water valve. Enquiries were good, both in numbers and in apparent genuineness.

New Geysers (1931), Ltd.

Exhibited a number of new models for the first time. Among these particularly was their No. 42 N.C. multi-point heater which is of the non-condensing type; the N.C. "Mite," a small heater for scullery sink, lavatory basin, dentists' and doctors' surgeries, &c., combining the principles of instantaneous and storage heat-

ing; the "Stora" bath water heater, a simple, storage type heater, non-condensing—suitable for situations where large gas supply pipes are not available; the "Efficient" gas wash copper—round or square in shape, low gas consumption, and not requiring ventilation; and the "Villa" circulator—a new 1939 model finished in porcelain enamel to be fitted in conjunction with existing hot water systems for use during summer months. New Geysers, Ltd., report that some direct orders were received at the Fair, but they regard the exhibition entirely from a publicity standpoint, and it is impossible to ascertain the amount of business which results indirectly from it.

Oxley Engineering Co., Ltd.

Report that there was considerable interest in their exhibits relative to all-welded gasholders and purifiers, and that a fair number of enquiries were received due to the exhibition.

Parkinson & Cowan (Gas Meters), Ltd.

Reported that general business had been good and enquiries had been received from buyers from Holland, Yugoslavia, and Sweden. The exhibits which had excited most interest were two new suspension lamps on swan-neck arms with reflectors inside the globe. One great merit of the Gas Section is that the Company's representatives are able to see a number of chairmen of gas companies and certain other people whom they do not meet personally otherwise.

Parkinson Stove Company, Ltd.

Business this year had been fairly up to standard. The shadow display of the "Renown" cooker had attracted most attention. It will be remembered that, by an arrangement of mirrors and an automatically varying light, various features of the cooker were displayed. On March 1 alone 128 young salesmen from the South Wales district called at the Parkinson Stove Company's stand. While unwilling to express an opinion as to the merits or otherwise of continuing the Gas Section, the attendants on this stand had no doubt of the publicity value of being able to demonstrate to engineers and particularly to the younger men of the Industry.

Radiation Ltd.

The very striking design of the Radiation stand created an extraordinarily good impression, and their special exhibit of large-scale apparatus came in for considerable attention. It will be remembered that we recorded last week the interest which His Majesty the King displayed in this particular stand. Radiation Ltd. are hopeful that the interest which was aroused will have a repercussion on business later in the year.

Sperryn & Co.

Business results were satisfactory and a number of new contacts made. Their special exhibits were a working model of a thermostat and a remote control valve. A number of foreign buyers had visited their stand from France, Belgium, Sweden, Poland, and Holland. While their name is already well known in connexion with thermostatic control, they welcome the opportunity of demonstration and of meeting a few new potential customers annually at the Fair.

James Stott & Co. (Engineers), Ltd.

Report that great interest was taken in their patent multi-compartment gas-operated pressure food steaming oven—as far as they are aware the only one of its kind operated by gas. As soon as cooking is finished and the door released, the steam is automatically cut off, gas being reduced to a lower flame just generating enough pressure for the other compartments' work and so on. Further great interest was displayed in their "Autofry" or automatically controlled chip frying range, wherein a handful of chips will bring the flame full on. They also had on the stand many novel features which created great interest. Messrs. Stott welcome the opportunity given in the Gas Section to meet their many friends.

Waterless Gasholder Co., Ltd. (and Subsidiary Companies).

Cannot expect to do much actual business on such an occasion, but welcome the opportunity of meeting prospective customers as well as old friends.

Westwood & Wrights, Ltd.

Did not exhibit in 1938, but consider that the 1939 Fair was successful from a business point of view. The patent gas valve exhibited in skeleton and shown as an electrically operated working exhibit attracted much attention. They are of the opinion that the demonstration value of the Fair has increased, and express satisfaction with results.

A. H. Wilkes & Co.

Regard results as quite satisfactory. A number of new contacts were made, some of which would not in the ordinary course of events have been covered by their travellers. Several foreign buyers from Poland and a greater number from Holland were much interested in working models of small tool hardening furnaces and soft soldering equipment. A demonstration of this had proved valuable.

William Allday & Co., Ltd.

The same remarks apply to this firm who are associated with Messrs. A. H. Wilkes. Much interest had been shown in their "Alcosa" filters and ventilators for gas-proof rooms. Also in an oilless blower for pressures up to 4 lb. per sq.in. for agitating chromium plating vats wherein solution must be kept in agitation. An entire absence of oil is essential in this process and the blower operates without lubrication.

Athletic and Social

Oxley Whist Drive and Dance.

The second annual whist drive and dance of the Oxley Engineering Co., Ltd., was held on Feb. 16, at the Capitol Ballroom, Meanwood, Leeds. The Chairman of the Company, Mr. H. H. Hollis, welcomed the guests, employees, and friends in a short speech at the commencement of the proceedings. The assembly of 170 people then began to enjoy the amenities of this Social Centre, and just over 80 resorted to the lounge where a whist drive had been arranged. In the meantime, dancing had commenced for those not playing whist, to the accompaniment of Dick Denny's band. When the whist drive concluded, everyone resorted to the ballroom, where the whist prizes kindly given by Mrs. H. Saville were duly presented. At the conclusion of this ceremony, the wife of the Chairman graciously presented Mrs. Saville with a bouquet on behalf of the firm. The dance terminated at 1 a.m., and was thoroughly enjoyed by all present.

Portsmouth Long-Service Presentations.

Alderman L. N. Blake (Lord Mayor) was welcomed as a new member of the Board of Portsmouth and Gosport Gas Company, when presentations were made to employees at a concert held in the Oddfellows' Hall, Kingston Road, Portsmouth, on Feb. 27. Mr. T. Carmichael, General Manager, presided, and was supported by the Chairman of the Company, Alderman Dr. F. E. Beddow, Mr. F. Kilpatrick (Director), Mr. R. W. Hewitt (Secretary), and Mr. E. Allison (Engineer).

The presentations which were the personal choice of the recipients in the case of those retiring, were made during an interval in the concert. Mr. Carmichael said their pension fund was inaugurated in 1924 and since then more than £25,000 had been paid out. At present 75 pensioners were drawing from the fund. The total number of contributors were nearly 1,000. Dr. Beddow, on behalf of the Directors and himself, hoped the men would be happy in their retirement. The healthy looks of those who were retiring after so many years proved, he considered, that employment with a gas undertaking was not inferior to any other employment. They were always striving to improve conditions. Wages last year were increased and extra holidays had been given.

Mr. Kilpatrick and the Lord Mayor thanked the artists and congratulated the organizers of the concert. Mr. A. E. Savins, Chairman of the Welfare Committee, responding, paid a tribute to the loyal help of his colleagues. Besides individual contributions at the concert, there was a sketch, "The Gas Manager's Nightmare," or "Gas a Bit Too Much at Your Service." The audience was kept roaring with laughter all through the piece. Players were: Mrs. Eliza Muggins, W. Hooper; Charlie, H. Couzens; Bill, E. Welch; Harry, V. Chamberlain; Canvasser, W. Ruston.

Individual turns were given by: Ron Arthur (piano), Miss Bertha Justice (contralto), Miss B. Nicholas (soloist), Bert Chant (entertainer), W. Benham (accordionist), The Harmony Three; accompanist, Miss Lilian Wyatt; compère, John Marwick.

Newbridge Male Voice Choir.

On March 9, the Annual Concert of the Newbridge Male Voice Choir (the Horstmann Gear Company, Ltd.) took place at the Pump Room, Bath, before a crowded audience. The programme was interspersed with items by the Pump Room Orchestra.

Prior to the commencement of the second half of the programme, the President of the Choir, Mr. G. O. H. Horstmann, presented a cheque for over £20 to the Chairman of the Bath City Football Club, being the proceeds of a Concert held recently by the Choir in aid of the Club's Funds. This is only one of the many occasions on which the Choir have given their services in aid of charities.

A SYMPOSIUM ON

Gas Purification

Extracts from Papers presented at a recent Conjoint Meeting held in Manchester of the Manchester Section of the Society of Chemical Industry, the Chemical Engineering Group, the Institution of Chemical Engineers, the Institute of Fuel, the Coke Oven Managers' Association, the Manchester District Association of Gas Engineers, and the Manchester and District Junior Gas Association.

REDUCTION OF ORGANIC SULPHUR COMPOUNDS BY OIL WASHING

By CHARLES COOPER, M.Sc.

The conditions for successful removal of sulphur compounds from coal gas by absorption in solvent oils can be generally appreciated by considering the four constituent groups of sulphur compounds which may be expected to be present:

(1) Carbon disulphide.
(2) Mercaptans.
(3) Thiophene and its homologues.
(4) Carbon oxysulphide (and possibly carbon monosulphide).

All but the last are known in the liquid form when isolated, and the oil flow ratio demanded for their absorption is not remarkably in excess of that employed in commercial benzole extraction plants. The last is a gas, and it is not to be expected that any economically operated oil-washing plant would successfully extract more than a small fraction.

The movement in this country in the direction of reduction of sulphur compounds to a hitherto unobtainable low limit depended firstly on the fact that the prejudice of the majority of gas engineers against benzole extraction itself was removed by the stimulus of an increasing tax on imported motor spirit, by a reconstruction of ideas on the therm cost of the extraction by the demonstration of the simultaneous extraction of naphthalene, and perhaps some other factors; secondly by the appearance on the market of benzole extraction plants of a much less complex and expensive construction than those used to supply the nation's necessities during the War of 1914-1918; and, of course, by the realization that the proposed new application was actually only an extension of the oil absorption process.

Distribution of Sulphur Compounds.

For desulphurizing, the extent of the increase demanded in oil handling capacity is roughly three times. Quoting from Hutchison's Paper to The Institution of Gas Engineers,[1] the quantitative distribution of sulphur compounds is as follows on the average:

	%
1. Carbon disulphide	61
2. Mercaptans	5
3. Thiophenes	16
4. Carbon oxysulphide	18
	100

The components we chiefly have to take into account are the carbon disulphide and the thiophene. Now the latter has properties so closely following those of benzene that it will be extracted in much the same proportion. As the oil quantity to be employed is in excess of that required for the full extraction of benzole, the properties of thiophene do not govern the requirements of the process to any degree. The carbon disulphide is the most important, as its properties fix the oil ratio to gas at 25 or more gallons per 1,000 cu.ft. of gas treated at normal temperatures. The mercaptans are also partly covered by this proportion of oil. The carbon oxysulphide is not measurably affected.

In the estimations quoted from Hutchison, the fourth group is of the nature of a difference figure. Its presence was deduced by the writer from an experiment carried out on an actual gas washer.

In a benzole plant of standard construction, and operating with an unstripped oil temperature of, say, 120° C., the consumption of live steam is normally about 1·25 lb. per gallon of oil. This relates to the benzole recovered as 30-40 lb. of steam per gallon of benzole, if the saturation in the oil is between 3% and 4%.

The primary economy practised on such plants is usually to employ as much exhaust steam as possible, but unless a higher degree of heat exchange is given, the actual or gross figure is not greatly varied. An American proprietary system has been reported as working on about 0·6 lb. of steam per gallon, using nearly all the steam consumed as the stripping steam applied in the still itself, and obtaining the preheat by using ample oil-vapour heat exchange.

One of the commercial processes for sulphur extraction employed in this country[2] works on a similar basis, the oil being preheated by oil/oil heat exchange followed by oil vapour heat exchange, and finally arriving at 100° C. in the still by condensation of further steam therein. The oil thus treated leaves the still with a small proportion of condensed water, which is immediately removed by gravity separation.

This process calls for 0·4-0·5 lb. of steam per gallon of oil, and is capable of recovering about 1 gallon of benzole with 50 lb. of steam. Its application is generally contemplated for smaller works, and those works where a convenient quantity of exhaust steam is available.

Representative working conditions are approximately as follows:

Temperature of oils and gas in scrubber (summer)	17°–20° C.
" " " " " (winter)	10°–14° C.
" " rich oil leaving preheat system	77°–85° C.
" " stripped oil entering final cooler	40°–45° C.
Sulphur in gas entering scrubber (summer)	21 gr.
" " leaving scrubber (summer)	6 – 8 gr.
" " entering scrubber (winter)	20 –30 gr.
" " leaving scrubber (winter)	5½– 9 gr.
Oil per 1,000 cu.ft. (summer)	27 galls.
" " (winter)	23 galls.
Steam per gallon of oil (summer)	0·46 lb.
" " " (winter)	0·47 lb.

Distillation Under Vacuum.

For further refinement and economy, a more complex system[3] is in use, and is described as regards its principles in the Paper by Hutchison previously quoted. The principle simplified is to work at temperatures such that exhaust steam is applicable for the final heating of oil, under 100° C., but to maintain unsaturated conditions in the still by working under a pressure of 4-5 lb. absolute. The advantages of working under vacuum are that condensation does not occur from the live steam used, and moreover, the low maximum oil temperature gives the oil a long life with freedom from sludge formation. This is important, as the heat exchange system is of a very comprehensive character.

It is estimated that resistances on the heat exchange system on both streams of oil (incoming and outgoing) aggregating 200 lb. per sq.in. can be tolerated, and at this point the expenditure of steam in the engines or turbines driving the oil and vacuum pumps will balance with the absorption of steam in the final heating of the oil, and the stripping operation itself. We have to add allowances for normal heat losses. When a balance is struck, on a plant of reasonable size, and with initial steam pressures of 80-100 lb. at the engines, the total steam consumed will be of the order of 0·3 lb. per gallon of oil, or 30 lb. per gallon of benzole.

Operating conditions are as follows on the average:

Temperature of oils and gas in scrubber	15°–20° C.
" " rich oil leaving preheat system	80° C.
" " stripped oil entering final cooler	45° C.
Sulphur in gas entering scrubber (summer)	33 gr.
" " leaving scrubber (summer)	8–9 gr.
" " entering scrubber (winter)	35 gr.
" " leaving scrubber (winter)	9·5 gr.
Oil per 1,000 cu.ft. (summer)	30 galls.
" " (winter)	30 galls.
Steam per gallon of oil (summer)	0·36 lb.
" " " (winter)	0·35 lb.

It will be noted that we have quoted steam per gallon of oil; this figure measures the technical success of the process

from the point of view of heat economy. The fraction of reduction of sulphur in the treated gas measures the success in meeting the requirement of low sulphur gas; but the steam per gallon of benzole recovered, with some other costs, of course, is the measure of what the improved process costs to run.

Partial Benzole Recovery.

It may be stated briefly that unless the gas-works carbonizing system is compelled to make very low calorific value gas, by reason of low revenue for coke, the process, worked to give a maximum yield of benzole, will actually yield a substantial profit over all charges; but it must also be noted that the gas engineer is not invariably able to permit substantially complete extraction of benzole. It is not proposed to initiate a discussion on the accountancy of carbonization, but the fact is admitted. Therefore such a process must be capable of giving parallel results with a diminished recovery of benzole. In practice this means making a benzole product of less than, say, 3 gallons of benzole per ton of coal, and concentrating the carbon disulphide content into this smaller yield. There are three ways of doing this.

The first is to employ a proportion of steam in the still which will ensure the stripping of the low boiling sulphur compounds, for practical purposes calculated on the CS_2, and to limit the removal of the hydrocarbons in this way. Technically this has been found inconvenient on the relatively small installation on which it was used, and where a low degree of benzole recovery was desired, the condition of the outlet vapours being very sensitive to minor irregularities set up by the pressure of the exhaust steam, and even by variation of the heat losses at different atmospheric temperatures.

For greater convenience, therefore, it is preferable to use the excess of steam called for by the full extraction of hydrocarbons, and to perform a secondary separation. One way is to pass the vapours through a fractionating column, the outlet vapour temperature controlling the flow of cooling medium. This column comes in the vapour line after the oil to vapour heat exchange. The condensate from the column is allowed to return to the stripped oil system and becomes part of the wash oil, until its concentration therein is so high that no more can be absorbed from the gas.

The third method is to condense and to separate from water condensate all the primary benzole fraction, and to pass it into a secondary still for division into a fraction high in sulphur and one low in sulphur. The former will generally be of a light character, and will, for example, if a recovery of only 50% of the hydrocarbons is desired, contain substantially nothing heavier than toluene.

We have just noted that working in these ways leads to a rising concentration of the heavier volatile hydrocarbons in the wash oil. This is beneficial to the process, as the mean molecular weight of the oil in the washer is considerably reduced. This effect is actually observed if the return of the fractional condensate is stopped for a time, and tests of performance carried out on fully stripped oil.

Low-Temperature and High-Pressure Processes.

Some variations of the processes described above have been proposed. The evident increased cost engendered by the rise of oil demand in the ratio 3 to 1, as compared with benzole extraction, has suggested that lower washing temperatures or higher operating pressures would give more economical working. While these suggestions have not been worked out in the same detail as those we have been considering, it is clear that a reduced oil flow would theoretically be effective. A consideration of the vapour pressure of CS_2 will show that a temperature of 4° C. would be necessary to halve the oil required as compared with 20° C., and this reduced temperature will be demanded in both the gas and oil. The cooling of saturated gases to this degree imposes a greater demand for refrigeration than might be supposed, and has some other technical difficulties. The Author has worked out a few cases, but was unable to show that the increase in capital and power costs called for by the refrigeration plant would be less than the increase called for by simply doubling the capacity of a normal plant. This, coupled with the inadvisability of introducing an extra chemical engineering operation, has so far ruled out low-temperature operation.

Quite similar arguments apply to the proposal to treat gas under increased pressure for this purpose, with this qualification—that if the treated gas is afterwards to be transmitted under such pressures, the cost of raising the pressure is not charged to the washing process. The number of cases where this condition will apply is comparatively small.

REFERENCES.

[1] "Gas Journal," 1937, **220**, 476.
[2] British Patent No. 430 989.
[3] British Patent No. 443,094.

THE RELATION OF TAR-FOG REMOVAL TO OXIDE PURIFICATION

By H. F. TAYLOR, F.I.C.

Recently attention has been focused on electrical de-tarring (see bibliography), and samples of oxide have begun to come forward which have been used for purifying gas treated by this method.

It is as yet rather early to make definite statements, as the oxide coming forward may not yet be truly representative, but after checking the history of the oxides as far as possible, a study of the analyses of oxides from works which have electrical de-tarrers shows:

(1) When the de-tarrer is fixed between the condensers and the scrubbers, as is most usual, a considerable reduction in the tar content of the oxide has taken place. The reduction is not as yet, however, anything like as much as would be expected. Whether this is due to further condensation of vapours, to polymerization of gaseous unsaturateds, or to some other cause, is an interesting matter for speculation.

(2) In three cases where the de-tarrer was working on gas at a comparatively high temperature little or no reduction in the high tar content of the oxide was found. This is very surprising and it would be interesting to know if confirmation of it will be forthcoming. It is possible that the removal of the heavy tar fog and all solid particles from the hot gas caused subsequent condensation to be in the form of a mist so fine that practically none of it separated out in the normal manner before it reached the oxide. It would be unwise, however, to speculate too far without confirmation at this stage and further information in this connexion is desirable.

(3) At many coke-oven works there is an electrical de-tarrer followed by a benzole washing plant. In these cases the tar in the oxide is almost *nil*. Apparently the added oil scrubbing in coke-oven practice removes almost all vapours which would otherwise condense in the oxide.

Position of De-Tarrer.

Consideration of the foregoing observations leads one to the conclusion that if only one de-tarrer is to be installed, then from the point of view of H_2S removal alone, the ideal place for it would undoubtedly be immediately before the purifiers. There are, of course, other factors to be considered, notably the detrimental effect of tar-fog on ammonia removal, and on the liquor, and it has been stated[1] that owing to the small quantity of tar to be removed thickening of the tar occurs resulting in "flashing back," if the de-tarrer is installed at inlet purifiers. Possibly the thickening of the tar is due to liberation of insoluble "free carbon" by action of low boiling condensates on the heavier pitch-containing tars. If this is so the effect will be severe on coke oven and horizonal retort gas, but much less on vertical retort gas, as tar from the latter gives much less insoluble matter on mixing with lower boiling oils. Probably the introduction of a spray of, say, creosote oil into the gas immediately before the de-tarrer has already been considered. The ideal would be apparently to have one de-tarrer immediately after the retorts to remove the heavy pitch-containing fog, and another immediately before purifiers to precipitate further condensations of light oils, as suggested by Messrs. Lodge, Cottrell, Ltd.

It would be useful to hear expert opinions on the question of the position of the de-tarrer in the gas stream.

Composition of Tars Precipitated Electrically.

In a discussion on tar fog it will be useful to have data available giving the actual composition of the tar fog, in

order to judge what its effect is likely to be on ammonia scrubbers, oil washing or oxide purification.

The literature is not very helpful. Ullman and others[2] working on coke oven gas in U.S.A. found that tar-fog precipitated by a small experimental electrical apparatus contained 12·5% of sulphur as compared with 1% in ordinary coal tar. They found that this tar caused thickening of petroleum wash oils, although a proportion of it passed right through wash oil, and also through an H_2S absorption tower (liquid process), two gasholders, and several miles of distributing mains.

White and Kellet[3] distilled tar which had been present as a tar-fog in the gas leaving the final coolers of a coke oven plant, and found that while the distillate below 300° had no effect on gas oil, the residue above 300° caused immediate sludging when mixed with gas oil.

By the courtesy of the managements at five works which have electrical de-tarring plant, six samples of tar precipitated electrically (between condensers and NH_3 scrubbers except the C.W.G. tar) have been supplied, and in Table I. distillation and other tests together with comparative tests on a typical sample of ordinary coal tar (almost entirely from vertical retorts) from the well of a large tar works are given.

The tests in Table I. show that the tars precipitated electrostatically are apparently very similar to the bulk of the tar produced by the particular type of retort in use, except that there has been added about 20% of light oils. The viscosity, sp.gr. distillation tests, tar acid content, naphthalene content, and pitch content fit in with this statement. The pitch content (30-50% according to the type of retort) shows how troublesome such tars would be if they were allowed to pass forward into oil-washing plant (where sludging would take place as is explained later), purifiers, or gas burning appliances. A sample of tar precipitated by means of a ring-packed tower situated at inlet purifiers, from vertical retort gas which had passed through a P. & A. tar extractor, was also found to contain a substantial proportion of pitch (33%) and to resemble, as regards the other characteristics alluded to above, a vertical retort tar which had been diluted with roughly half its volume of light oils.

The conclusion we draw from these tests is that the tar-fog which passes the ordinary tar condensing and collecting plant consists for the most part not of lower boiling oils left over by true fractional condensation but of the more finely divided particles of the original tar-fog of the crude gas—*i.e.*, the difference from the bulk of the tar-fog is mainly one of particle size and not of composition or boiling point, although varying amounts of light oils condense subsequently and mix with the tar-fog.

General characteristics of the electrically precipitated tars—

Water content.—The coke oven tar was fairly free from water, but the other five samples were accompanied by 30-60% of ammoniacal liquor. Most of the liquor separated on standing, and a tar containing less than 4% of liquor was decanted off, except in the case of tar from water gas, which gave a little tar containing 8% of liquor and a large amount of permanent emulsion.

Viscosity.—All the tars were considerably thinner than the ordinary tar from the particular type of retort.

Insoluble matter produced on mixing with creosote—

All these tars gave a certain amount of insoluble matter when mixed with coal tar creosote such as is used for wash oil or with other lower boiling coal tar distillates (and they would almost certainly give larger quantities if mixed with petroleum wash oil). With creosote the tars from vertical retort gas gave only very small quantities of insoluble matter, but tars from horizontal and coke oven gas gave very appreciable quantities when mixed with four times their volume of creosote. This insoluble matter was partly of a sticky nature, adhering to glass even after washing with benzole, and would be likely to cause trouble wherever it was precipitated.

Unsaturated character of tars—

As regards the chemical composition, the relative degree of unsaturation appeared to be one of the more important characteristics to study, since this is likely to affect the formation of gummy or resinous deposits.

It was therefore decided that the bromine absorption test was unsuitable for the determination of unsaturation in coal-tar fractions.

A more suitable test than the bromine absorption test would appear to be to determine the loss in volume on treatment of the lower boiling fractions of the tars (freed from tar acids and bases) with 90% sulphuric acid, together with the quantity of resins formed in solution and left behind when all volatile oils have been driven off from the acid-treated oils.

Four of the distillates to 200° C. were tested by this method, the procedure being to shake, say, 50 c.c. of the fraction washed free from bases, with 10% by volume of 90% sulphuric acid added in two portions, each being shaken for two minutes, settled, and run off. The oil was then transferred to a clean separating funnel, and washed with water and 7% caustic soda solution. The washed oil was measured to determine the loss, transferred to a weighed flask, and the volatile portion distilled off, the heavy oils being finally driven off by heating in an oil bath at 200° C. while steam was blown through until only traces of oil were distilling over with the steam. The residual resin was dried in the flask and weighed.

The results of these four tests are given in Table II.

TABLE I.—*Distillation Tests on Tars from Electrostatic Precipitation Plants.*

The tar was distilled to 330° C., the distillate washed free from tar acids and re-distilled in a side tube flask. The melting point of the residue of pitch was determined and the appropriate correction made to bring the pitch to the "medium soft" standard.

Type of Retorts.	Tar. Sp.Gr. of Tar.	Distillation Tests. C.c. per 100 Gms. Tar in 2nd Distillation.						Presence of Naphthalene, &c.
		– 200° (Exclu. H_2O).	200° to 230°.	230° to 270°.	270° to Pitch.	Tar Acids in Distillates.	Pitch, Gms. per 100 Gms.	
1. Vertical	1·03	18·5	15·5	9	9	12	38	Small amount of crystal in fraction 3 only.
2. Vertical	1·03	17·5	11	10	12	12	40	Small amount of crystal in fraction 3 only.
3. Vertical + horizontal	1·04	22	20	11·5	8·5	8·5	30	Fractions 2 and 3 solidified completely.
4. Horizontal	1·13	10	17	9	5·5	3·5	48	Fractions 2 and 3 solidified completely.
5. Coke oven	1·12	7·5	14	11·5	8·5	5·5	51	Fractions 2 and 3 solidified completely.
6. C.W.G.	1·04	15·5	13·5	18	8·5	0	37	Fraction 2 half solidified. Fraction 3 three-fourths solidified.
Ordinary gas-works tar— Mainly vertical	1·09	6·5	5·5	10	14·5	8·5	50	Small amount of crystal in fractions 2 and 3.

TABLE II.—*Loss and Resins Formed on Treatment with 90% H_2SO_4.*

[Fractions to 200° C.]

—	Per 100 C.c. Fraction to 200° C.	
	Loss After Treatment with 90% H_2SO_4, &c.	Resins Formed (Left in Solution in Oils).
From tar 1 (electrically precipitated from vertical retort gas)	12 c.c.	<11 gms.*
„ 2 (electrically precipitated from vertical retort gas)	12 „	7 „
„ 4 (electrically precipitated from horizontal retort gas)	8 „	12 „
Ordinary coal tar (mainly from vertical retorts)	10·5 „	6·5 „

* Soft sticky resin, not free from volatile oils. Others were brittle or slightly plastic resins.

In 1936 a sample of tar from a different position in the gas stream to the samples referred to above was examined. In this case the tar was extracted by means of a ring-packed tower situated after a P. & A. tar extractor and the ammonia scrubbers and immediately before the purifiers. The opinion was expressed at that time that this tar was much more highly unsaturated than ordinary vertical retort tar. In view of further work on the determination of unsaturated bodies and the fact that compounds such as xylene can absorb considerable amounts of bromine it is now felt to be advisable to defer speculation on the actual degree of unsaturation of this tar until further tests have been made.

It has been shown that these electrically precipitated tars closely resemble ordinary coal tar to which about 20% of the more volatile portions of ordinary tar has been added, and like ordinary tar, they are highly unsaturated, containing considerable quantities of resin-forming compounds of the type of coumarone and indene. In addition, it has been shown that they contain 30-50% of pitch.

It is obvious, therefore, that if such fogs were allowed to pass into the distribution system trouble might result. The probable reason such trouble has for the most part been avoided in the past in this country is because the oxide used in the dry purification system acts as an efficient tar-fog remover. To use the oxide for this purpose is not, of course, the best practice and entails certain penalties, notably an increase in the back-pressure thrown by the purifiers. This may mean emptying the purifiers sooner than would otherwise have been necessary (which causes additional expense in handling) or alternatively allowing the oxide to pass out as spent with a lower percentage of sulphur, which entails a higher consumption of new oxide.

It is part of the long-suffering nature of oxide, however, that it continues to absorb H_2S even when it has become contaminated with tar, and unless difficulty arises from excessive back-pressure oxide can be taken up to 50% of sulphur even after it has absorbed, say, 3% tar although extra handling will be necessary. Possibly the sulphur in separating from the oxide of iron takes the tar with it, thus preventing the latter from coating the surface of the oxide.

It would be outside our province to deal with the other economies effected when de-tarring is practised—*e.g.*, increased efficiency in ammonia recovery, cleaner liquor, &c.

Conclusions.

Consideration of the foregoing leads one to the conclusion that oxide purifiers serve several very useful purposes in conjunction with electrical de-tarring plant—viz.:

(1) To remove such traces of fog as may pass the de-tarrers if these are not always working at 100% efficiency or during breakdowns and temporary stoppages for repairs.

(2) To remove oil-fog which passed the de-tarrers as a vapour, condensing as fog subsequently owing to lowering of the temperature. This fog contains unsaturated bodies capable of forming gums.

(3) To remove in part nitric oxide which forms with di-olefines of the type of butadiene and cyclopentadiene, the gums about which much has been written lately by Fulweiler and others according to H. Hollings[4] nitric oxide is removed to the extent of 50% by normal oxide purification).

(4) It seems reasonable to suggest that gaseous unsaturated bodies which are likely to cause deposits in the consumers' apparatus would be more likely to deposit first in passing through the oxide, because of the large contact surface presented by oxide and the large number of fine interstices through which the gas has to pass.

Everyone interested in improving the efficiency of oxide purification will welcome the time when electrical de-tarring has become common practice. In recent years the oxide has often had to eliminate from the gas up to 20 grains per 100 cu.ft. of ammonia, reduce the hydrogen cyanide down to 4 or 5 grains, remove the H_2S to pass the extremely stringent Gas Referees' test and at the same time has been called upon to take out the 17 grains of tar-fog which is the average figure obtained from the analysis of a large number of samples of oxide recently examined. If the contamination with tar could be reduced to only such traces of tar or gum-forming bodies as might elude electrical de-tarring, then the production of a higher quality spent oxide with the minimum amount of handling would result, and the cost of purification would be appreciably reduced.

REFERENCES.

[1] Hawkyard. "GAS JOURNAL," 1938, **222**, 596.

[2] Ullman and others. J. Ind. Eng. Chem., 1929, **21**, 313.

[3] White and Kellett. *Gas World* Coking Section, June 4, 1932, 10.

[4] H. Hollings. "GAS JOURNAL," 1936, **216**, 459.

Descriptions of electrical de-tarrers in operation:

At gas-works—
Francombe. *Gas World*, 1936, **105**, 39.
Albinson. "GAS JOURNAL," 1937, **220**, 105–109.
Astbury. "GAS JOURNAL," 1938, **221**, 872–873.
Hawkyard. "GAS JOURNAL," 1938, **222**, 596.
Blundell "GAS JOURNAL," 1938, **223**, 743–745.

At coke-oven plant—
Bradwell. *Gas World* Coking Section, June 2, 1934, 11–16; *ibid.*, Coking Section, July 7, 1934, 9–12.

Description of Holmes tar-fog arrester with wood-wool filling:
Stokes. *Gas World*, 1936, **104**, 226–228; "GAS JOURNAL," 1936, **213**, 701.

(To be concluded)

A.R.P. Notes

Terminal Velocities and Maximum Depths of Penetration of Bombs.

Memorandum No. 2 of the Institution of Civil Engineers deals with the penetration of bombs. It will be recalled that No. 1, dealing with blast, was reviewed in our issue of Jan. 18.

The penetration of a bomb falling with a given velocity depends very largely on its sectional density or the ratio of its weight to its maximum cross-sectional area. Since the steel case of a bomb has a much higher density than its high-explosive filling, the sectional density depends on the charge/weight ratio, or the weight of explosive expressed as a proportion of the total weight of the bomb.

Diagrams are given of the variation of sectional density with the charge/weight ratio, and of the way in which the charge/weight ratio varies with the relative thickness of the bomb casing. The penetrative power of any given bomb depends on its striking velocity, and for any bomb there is a terminal velocity at which the air resistance is equal to the weight of the bomb. Approximate terminal velocities are given for bombs of different sectional densities, and it is considered possible that the terminal velocity for a bomb of high sectional density might be as much as 1,500 ft. per second, though such a velocity could only be reached in practice if the bomb were dropped from a height of 40,000 or 50,000 ft. The practical upper limit for the arrival velocity of a very heavy bomb of high sectional density is probably about 1,200 ft. per second. At the other end of the scale a small incendiary bomb, with a low sectional density, might have a terminal velocity no higher than 400 ft. per second, and this terminal velocity would be easily reached in practice.

The depths of penetration for a number of different materials are shown diagrammatically for a bomb of unit sectional density. The actual depth for any bomb is obtained by multiplying the unit depth by the appropriate value of the sectional density. As an illustration of the actual results indicated by the diagram, a small incendiary bomb with a sectional density of ½ lb. per sq.in., and an arrival velocity of 400 ft. per second would penetrate concrete (of medium strength) to a depth of about 1 in., and alternatively sand, gravel, or earth to a depth of about 1 ft. A 500 lb. bomb with a charge/weight ratio of 40% or a 2,000 lb. demolition bomb with a charge/weight ratio of 55% might be expected to have a maxium depth of penetration of 2 ft. 6 in. in concrete of medium strength, and, alternatively, of a little over 20 ft. in sand or gravel. The maximum vertical depth into the ground which could be reached by a 2,000 lb. bomb of high sectional density specially designed for good penetration (and therefore containing only a small proportion of high-explosive), is estimated as being unlikely to be more than 50 or 60 ft. This estimate, however, is not to be taken as indicating the depth of earth cover required for protection against such a bomb as it does not include an allowance for the disruptive effect of the explosion.

The Memorandum appears in to-day's issue of the Journal of the Institution of Civil Engineers, and can be purchased from Messrs. William Clowes & Sons, Ltd., 94, Jermyn Street, London, S.W. 1, price 6d. post free, as well as pamphlet copies of Memorandum No. 1 Blast, price 6d. post free.

Manchester and District Junior Gas Association

The 7th meeting of the session was held in the Gas Showrooms, Manchester, on Saturday, March 4, when Mr. Platt presided over a large attendance of members.

A Paper was read by Mr. E. Bates, M.Inst.Gas E., entitled "The Operation of Intermittent Vertical Chamber Ovens Combined with Coke Dry Cooling Plant." A substantial extract from the Paper appeared in the "JOURNAL" last week.

Discussion.

Mr. R. J. Restall (Stalybridge) remarked that in regard to the plant at Stalybridge, he felt justified, after four years' working, in stating that for a combination of good results, easy working, and freedom from trouble, the intermittent verticals would be hard to beat. The results obtained for the year following that taken by the Author showed a slightly lower cost into holder—viz., 11·3d. per 1,000 cu.ft., ignoring capital costs. The improvement appeared to have been obtained by the saving in fuel to the producers, and slightly better gas and benzole yields; and concentration liquor had been sold during the year. All coals used were washed and the coke obtained was of good quality, with an ash content as low as 5·2%, with a maximum of 7·1%. Strictly speaking, it was not a free burning type of coke, but it gave a good fire after ignition. Dry cooling was apparently responsible for the quietness and lack of spluttering during the ignition period. With regard to the Author's summary, he thought they must recognize that all plants were reliable and efficient, but he did think chamber ovens had the advantage so far as labour costs and flexibility were concerned.

Mr. J. Albinson (Manchester) thought it must be emphasized that the chamber type of oven required a local, or, at any rate, a reasonably near, market to dispose of the coke. The Paper stated that there was no difficulty in disposing of the coke locally, and no doubt they all wished they could dispose of vertical coke with the same facility. He would like to know if any experiments had been conducted with the object of ascertaining whether dry cooling had any influence upon the reactivity of the coke. Had samples been taken of the coke discharged direct from the oven, and also after dry-cooling, to ascertain whether dry cooling had given some kind of surface activation to the coke?

Mr. Bates stated that no tests had been made with regard to combustibility and reactivity.

Mr. W. T. Hainsworth (Wallasey) enquired whether a steam engine or an electric motor was used for the skip hoist. There did not appear to be any alternative to the skip hoist. In the event of a breakdown, how was coal got to the top of the tower? He observed that all nine ovens were kept in continuous operation; presumably the ovens were suitably slacked back when the output was low. What was the position when renewals were necessary? Would all the nine ovens be due for overhaul at the same time? Would it not have been better to have worked six ovens and kept the others in reserve?

The high fuel figure of 18 lb. per 100 lb. of coal indicated that it was not practicable to have recuperation and waste heat recovery on the same plant.

Mr. Bates stated that the skip hoist was driven by an electric motor, fed from a generator driven by an Allen compound engine run mainly by waste heat steam. In the event of the skip hoist breaking down, the passenger lift could be used for hoisting coal and coke. There would be three days' supply of coal in stock. By continuous working, it was thought that other parts of the plant were likely to wear out before it was necessary to re-set the chambers. The Consett Iron Company had a battery of coke ovens which had been running continuously for over 12 years, and the walls were still as straight as the day they were put in. During the first four years the sum of £2,500 had already been put aside towards the cost of re-setting. The theory of working the nine chambers together was that it cost a great deal more to shut down a plant year after year than it did to build a new one.

The **President** (Mr. Platt) pointed out that the thermal output was given as 83 therms. Was this before benzole extraction?

Mr. Bates replied that the figure was actual gas made; the benzole extraction was responsible for approximately 1½ to 2 therms.

Mr. A. K. Collinge (Preston) enquired if any experiments had been made in regard to varying the cracking space, according to the Pexton formula. The Paper gave a 2 ft. cracking space. Could that be reduced by increasing the weight of the charge? It was assumed that the increase in therms obtained—viz., 86 *plus* 1·2 gallons of benzole, was due to a better conversion of steam into CO. This assumption seemed to be unjustified, for by increasing the depth of fuel by possibly 1 to 1½ ft. in the retort, the effect on the steaming efficiency would be slight, because the coal shrank. Was the steam passing up between the sides of the retort and the coke?

Mr. Bates stated that no research work had been carried out on the lines indicated.

Mr. E. B. Field (Blackburn) said he was astonished by the results given in the Paper. They were the highest he had seen published for intermittent working. Did Mr. Bates consider the same results could be obtained over a long period, as they compared favourably with the results one might expect from continuous vertical retorts working with a similar class of coal. One point which was very remarkable, as far as intermittent work was concerned, was the continuous scurfing period. Did Mr. Bates find it was quite unnecessary to scurf his chambers separately at other times, apart from continuous working? The temperatures of the retorts appeared to be rather low, 1,310° C. being the maximum. Was the coal blended at Stalybridge?

Mr. Bates, in reply, said that the continuous scurfing period definitely dealt with all the scurf that was formed in the chambers, and it had never been necessary to leave one off beyond the usual period of half an hour which was generally taken to clean the bottom doors, offtake pipes, and so on. The temperature might be rather low, but with the charge being static it had quite a long time in which to soak. The chambers were narrow and by means of silica retorts it was possible to work at that temperature and obtain good results. There was a coal blending plant, but the coals used were mainly washed slacks and could not be dealt with conveniently in a continuous vertical plant.

Mr. H. N. Dann (Blackburn) enquired if benzole recovery was continuous or intermittent. When the minimum number of ovens was at work the steaming period of 12 hr. was 2·5 hr. shorter than the actual carbonizing period. With 15 ovens charged per day, the carbonizing period was 10·70 and the steaming period 3·20. Obviously, the quality of the gas leaving the plant when steaming for 12 hr. could not be the same as when steaming for 3 hr. when the maximum plant was at work.

Mr. Bates explained that when on the lower number of chambers, only the same percentage of steam was being put through—viz., 8 to 10%. Steam was cut down considerably in 8 chambers, as compared with what was the case in the higher number. Benzole recovery was continuous and the figure was the average over a year. The benzole plant was installed mainly for the purpose of making coke. In summer there would be a tendency not to get so much benzole out, owing to the oil being at a higher temperature in the cooler.

Mr. D. Benson (Bolton) enquired what was the variation in the calorific value of the gas.

Mr. Bates stated that there were long periods when the calorific value did not vary more than 5 B.Th.U.

Mr. J. Albinson proposed a vote of thanks to the Author, and this was seconded by **Mr. H. H. Thomas.**

A Portable Window Display

This striking Portable Showroom Display featuring Ewart's "Empire" Multi-point is available for gas undertakings.

Lea Bridge District Gas Company

The Annual Ordinary General Meeting of the Lea Bridge District Gas Company was held at 5, Great Winchester Street, Old Broad Street, E.C. 2, on Tuesday, March 7, 1939—Mr. ARTHUR M. PADDON, M.Inst.C.E. (Chairman of Directors), presiding.

The SECRETARY (Mr. Norman H. Davies) read the notice convening the meeting, and the Directors' Report and Statement of Accounts for the year ended Dec. 31, 1938, were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, in moving the adoption of the Report and Accounts, first referred to the loss the Board had sustained by the retirement of Mr. E. L. Burton. Most of them were conversant with his great experience and high professional qualifications, and they would miss him very much on the Board. They had been fortunate in obtaining the services of Mr. Hyde Clarke Burton to succeed him, who brought with him many of the admirable qualifications of his father, as well as some of his own. They knew they had secured a most useful colleague by appointing him.

The second paragraph in the Report stated that the sale of gas during 1938 showed a decrease to an extent which, though not alarming, was rather more than they desired to see. The Report also mentioned one of the principal reasons for this decrease, to which matter he would refer later.

The Accounts.

Turning to the accounts, the Chairman observed that he did not think they need concern themselves with the statement of capital, which simply set out the capital of the Company and indicated their powers for raising further capital in future. Coming to the Capital Account, it would be seen that they had expended during the year the sum of £15,589, which had been largely accounted for by the reconstruction of their offices and certain necessary expenses in regard to new meters which they could not reasonably avoid. Expenditure on meters was a growing one from year to year and kept pace with the development in the use of gas, which frequently necessitated the replacement of meters which had hitherto been adequate.

It would also be seen that they had written off by depreciation the sum of £8,206, so that the net increase in capital was £7,383, which really represented a permanent profit-earning asset in the shape of apparatus and plant at something like half their capital cost. Any company which was not actually increasing its business wanted to avoid capital expenditure in every possible way; but the Lea Bridge Company found itself compelled to expend capital in order to effectuate economies which would reduce their expenditure on Revenue Account. It was not speculative but essential that they should expend capital at a moment when they might otherwise desire to avoid so doing.

Coming to the Revenue Account, it would be observed on the credit side that notwithstanding the decrease in the sale of gas they had received £187 more from this source than in the previous year, and £1,453 more by Rental of Meters and Stoves and Fittings. This was due to two causes—first, obviously, to the increase in the price of gas, and secondly, they had lost—as mentioned in the Report—some of the industrial load which was previously sold at a lower rate and therefore did not have such an adverse effect on their accounts as would the loss of ordinary consumers.

Receipts from residuals showed a drop of £1,701, which was the inevitable result of a smaller amount of coal carbonized. Miscellaneous receipts were up by £170—and the total revenue showed a small increase of £108.

The price of gas had been raised during the current year by 0·6d. per therm, making the present price 9·6d. per therm. They would realize that this was less than many of the more important London gas undertakings were compelled to charge at the present time; so it could not be said that they had carried their price beyond a reasonable limit to meet the extra costs they would incur.

On the other side of the Revenue Account their smaller consumption of coal, oil, and coke was reflected by a reduction under this heading of £2,698; but repair and maintenance of works and plant had increased by £5,611. Repair, maintenance, and renewal of mains was up by £2,278, while repair and maintenance of meters, to which he had already referred, had cost £2,627 more for the reasons he had stated. Repair and maintenance of stoves and fittings was down by £1,994.

The only other items to which he need draw their attention was the contribution of £1,948 to the Co-Partners' Contributory Pensions Fund, and the amount of Bad Debts of £992. While the latter was rather more than they liked to see, it must be remembered that they carried on their business in a district which had special difficulties not met with in more opulent areas.

The net result was that expenditure on Revenue Account was up by £1,118 and the profit down by £1,010.

Profit and Loss Account.

In the Profit and Loss (or Net Revenue) Account it would be seen that they had made a Special Contribution of £2,000 to the Contributory Pensions Fund. This special amount, in addition to the regular contribution, had been made in order gradually to establish the solvency of the Fund. They would notice that they brought into the Account the sum of £20,434 and took out the sum of £16,505, so that they had drawn practically £4,000 on the "carry-forward."

The Reserve Fund and Special Purposes Fund Accounts were well invested. The Special Purposes Fund replaced their old Insurance Fund, and they could only have recourse to it in exceptional circumstances. Nevertheless, the two funds constituted strong reserves as a background to the Company's finances and were of material advantage when issuing capital or in maintaining the market value of their stocks.

They still had a considerable balance at the credit of the Renewal Fund Account to meet any abnormal demands on revenue account for repairs.

The Balance-Sheet.

Coming to the Balance-Sheet, the Chairman said he had already drawn attention to their Reserve Fund and Special Purposes Fund investments which had a book value of £88,697. If they looked below they would see that the market value of these investments —which were entirely outside the Company—amounted to almost £107,000. He was sure they would agree that this constituted a very strong element in the Company's financial position.

The Co-Partnership Fund had reached nearly £40,000, while the Co-Partners' Contributory Pension Fund amounted to over £56,000, of which only a small portion was not invested—and this would be invested in the course of a few days. This Co-Partnership Fund was a special feature, a safeguard, and an asset to the Company in the conduct of its business. They had at all times received the most loyal co-operation from their co-partners in the promotion of the Company's interests, and particularly during the past year which had been one of exceptional difficulty. At Christmas time they had to meet conditions outside their experience during the past ten or twelve years, and in these circumstances of extraordinary demand, the Company, like many others, had to depend upon the loyalty and co-operation of the staff and employees generally in weathering the difficulties with which they were confronted. The staff responded in the highest possible degree to the demands made upon them, and the success in meeting those demands was due to a large extent to their loyalty and spirit of co-operation.

Future Prospects.

With regard to the future, the Chairman said he could not tell them a great deal more than they knew already. Their accounts were qualified by the large industrial load which they carried—and an industrial load had advantages as well as disadvantages. It was advantageous in its regularity and stability during those hours of the day when they could most economically deal with it. It was disadvantageous in that big units were disturbed by the loss of industrial consumers; for example, they had suffered a reduction of 59 million cu.ft. in the consumption of one consumer. Nevertheless, he did not think the commercial and economical equipment of a Company was sound unless it had a certain amount of industrial load. Such a load was also valuable from a publicity point of view—in educating the public in what gas could do. Those engaged in an undertaking using gas for industrial purposes were able to appreciate the advantages of gas, and from this aspect the load was of the greatest possible advantage as an advertising medium.

He could not tell them what effect the increased cost of coal would have, but he hoped that they had seen the worst of the increase. He ventured to suggest that the coal suppliers had bitten off rather more than they could cope with. The supply of coal was regulated by interests which were wholly bound up in the coal industry and not concerned with national interests. It was true that there were certain avenues of appeal, but inasmuch as those Tribunals consisted of the same interests they could not expect very much from the provisions made in that direction.

Nevertheless, taking the prospects in general, he thought they should do as well in the current year as they had done in the past. But they would have to set their house in order and effect economies; but there was nothing like hard times for educating one in the reconstruction of one's business.

The CHAIRMAN then formally moved the resolution for the adoption of the Report and Accounts, which was seconded by the DEPUTY-CHAIRMAN (Mr. G. W. Carey) and carried unanimously.

Dividends.

The CHAIRMAN thereafter moved the declaration of dividends for the half-year ended Dec. 31, 1938, at the following rates per annum (all less income-tax), payable on Friday, March 10, 1939:

4% on the 4% preference stock.
5% „ 5% „
6% „ 6% „
8½% „ consolidated ordinary stock.

This was seconded by Mr. HYDE C. BURTON, F.C.A., and carried unanimously.

Election of Director and Auditors.

The DEPUTY-CHAIRMAN moved the election of Mr. A. M. Paddon, being the Director retiring by rotation. Mr. Paddon, he remarked, had high qualifications for the post he held and was so well known that he did not think he could add anything to their knowledge. He personally had had the privilege of working with him in the Lea Bridge Company for nearly 32 years—he said privilege advisedly, because Mr. Paddon was a very great administrator and it was a great privilege to work with him. They would be consulting their own interests in supporting this resolution.

The resolution was seconded by Mr. A. E. PIERCE and carried unanimously; and the CHAIRMAN, in reply, thanked them very much for his election and observed that while his powers might not be what they were thirty years ago they were at the Company's disposal and would be devoted to that end.

Mr. Thomas W. Baird, F.C.A., the Auditor retiring by rotation, was re-elected, and Mr. G. Murray Burton, M.A., F.C.A., was appointed to fill the vacancy occasioned by the retirement of Mr. Hyde C. Burton.

Votes of Thanks.

The CHAIRMAN proposed a hearty vote of thanks to the officers, staff, and workmen of the Company for their services during the past year. Their business was growing year by year, and the work of the staff became more arduous as time went on. Even if the 1938 results were not as satisfactory as they might have wished, if it had not been for the work of the staff they would not have achieved the success they had. It was within the power of every employee to do something to advance the interests of the Company and its service to the public. For Mr. Cross and Mr. Davies they had nothing but terms of the highest appreciation; they were splendid officers and gave the Board every possible support.

Mr. STANLEY H. JONES seconded the resolution, which was carried unanimously.

Mr. D. C. CROSS (Engineer and General Manager) said how much he appreciated the kind words which the Chairman had said, and he would have great pleasure in passing on the vote of thanks to the staff. Reference had been made to loyal co-operation, and he would like to pay special tribute to all co-partners for their work during the past year. The period had been an exceptional one, and the service and loyalty of the employees was something of which the Directors and stockholders should know; they were all assisting in the call for higher efficiency.

Mr. NORMAN H. DAVIES also responded on behalf of himself and the staff he represented. This annual expression of thanks for services rendered was greatly appreciated and something which the workers in the Company with whom he was happy to be associated were very pleased to receive.

The meeting closed with a cordial expression of thanks to the Chairman and Directors on the proposition of Mr. A. W. OKE, seconded by Mr. A. E. PIERCE, which was duly acknowledged by Mr. PADDON.

Gas Undertakings' Results

Brighton, Hove, and Worthing.

A small decrease in consumption in 1938, as compared with the previous year, was reported by the Directors of the Brighton, Hove, and Worthing Gas Company at the annual meeting last Friday, an account of the proceedings at which will be found in another part of this issue of the "JOURNAL." The total quantity of gas sold (including a certain quantity for ancillary processes) was 15,235,580 therms, which compares with 15,459,160 therms in 1937. While the total rental (including meters, stoves, and fittings) is about £12,000 down, the returns from residuals figure are some £20,000 more. On the other side of the Revenue Account, expenditure is up some £8,000, and the balance carried to Profit and Loss Account is very nearly the same as a year ago, at £138,702. During the year there has been a net increase in capital expenditure of over £40,000, but further capital has been raised, which left the Capital Account at the end of the year in credit to the extent of £119,120. The dividends for the year are 7½% on the 6% standard consolidated stock, and 6¼% on the 5% standard consolidated stock—leaving a balance of £41,165 to be carried forward, which compares with £44,711 brought in.

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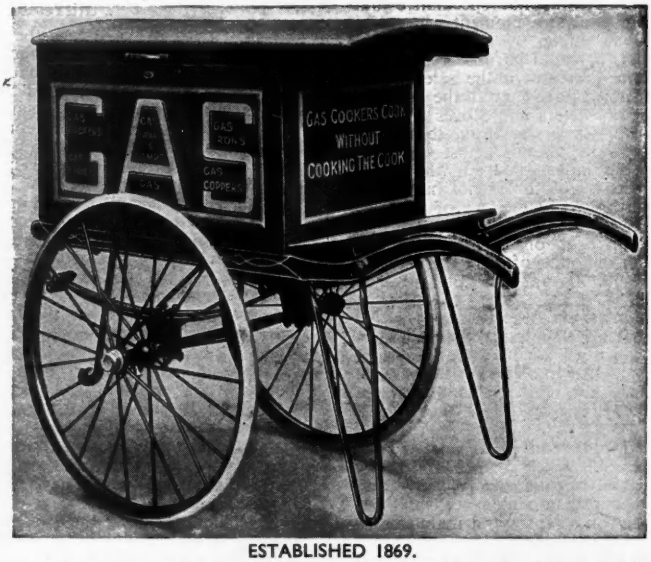

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Sheffield and District Gas Company

The Annual Ordinary General Meeting of the Sheffield and District Gas Company was held on Monday at the Company's Offices—Lieut.-Colonel Sir HENRY K. STEPHENSON, Bart., D.S.O., LL.D., J.P. (Chairman of Directors) presiding.

The CHAIRMAN, moving the adoption of the Annual Report and Statement of Accounts for the year ended Dec. 31, 1938, said:

I need scarcely remind you that these Accounts cover a year during which, owing to the aggressive policy of Germany, crisis succeeded crisis with unexampled rapidity and our own country was brought to the brink of war. We owe a deep debt of gratitude to our Prime Minister for saving the world from such a catastrophe.

In these circumstances it is remarkable that while the general trade of the country suffered a severe set-back, your Undertaking not only maintained its position, but continued to increase its sale of gas and appliances.

While this, for us, happy state of affairs may to some extent have been caused by the re-armament programme, I think it is due to an even greater extent to the public's growing appreciation of the advantages which gas offers as an industrial and domestic fuel. As you will have observed, the total quantity of gas sold during the year was over 10,717 million cu.ft.—being an increase of nearly 8% over the previous twelve months, which I am sure you must consider a very gratifying result.

The Accounts.

The Accounts include the results of a full year's working of the Barnsley Undertaking, whereas the last year included only nine months.

On the expenditure side of the Capital Account you will see that new buildings have cost the Company £5,598, while we have spent £59,495 on the Gas Grid Scheme.

This latter figure includes not only the connecting up of two additional coking plants, but also the major portion of the cost of installing a new set of purifiers at the Effingham Street works.

Turning to the Revenue Account (No. 4) the income from the sale of gas has increased to £836,641. There is also an increase of £10,000 in the revenue from residual products which is due to our having been obliged to manufacture more gas due to the shortage of coke oven gas; but against this must be set the extra expense of manufacturing gas as compared with the purchase of coke oven gas. The distribution of gas has also cost more than in 1937 and expenses have increased in various other directions.

The other items in this account call for little comment and you will be pleased to see that we carry to the Profit and Loss Account (No. 5) a balance of £245,703 as compared with £240,381 in 1937.

I now come to the matter of the dividend, and your Board are glad to be able to recommend that this should be 3¼% for the half-year, which, with the interim dividend at the same rate paid for the first half of the year, will make 6½% for the whole year—the same as for 1937. I am sure you will consider this satisfactory and that you will pass the appropriate resolution when it is put before you.

The Company's Bill.

You will remember that a year ago we promoted a Bill in Parliament seeking powers to extend your Company's Coke Oven Gas limits over an area where there were potential supplies of coke oven gas—we also sought powers to include the Parish of Orgreave, where we already were supplying gas, in our ordinary limits of supply. These parts of the Bill were strongly opposed and on both points the House of Lords Committee refused our application. The non-controversial clauses of the Bill, including the change in the Company's name to "The Sheffield and District Gas Company" were allowed to proceed and the Bill received the Royal Assent last July.

It would scarcely be in order for me to criticize the decision of the Committee, but it certainly took us by surprise, especially as the Opposition were not called upon to reply.

As you will have gathered from my remarks in dealing with the accounts, the reduction during the past year in supplies of coke oven gas from several of the Coking Companies which are members of the South Yorkshire Gas Grid Company has not only caused us much concern, but also put us to very considerable expense by obliging us to manufacture gas at our own works to make good the deficiency.

As bound by the Act of 1931 your Company have "used their best endeavours to promote the sale of this gas for industrial purposes," with the result that the sales of gas have increased since that date from 5,000 million cu.ft. to nearly 11,000 million cu.ft. In other words, your Company has, at great expense, popularized and distributed this gas much to the benefit of the coke oven owners, who, before its intervention, were blowing it to waste in the air.

For their part, in the same Act, the sellers—that is, the Coke Oven Companies forming the South Yorkshire Gas Grid Company—undertook to "use their best endeavours to provide such quantity of gas and for such a period as may be specified by the buyers."

It is, of course, common knowledge that during the recent slump in iron and steel it has been difficult to dispose of coke, while certain firms in Nottinghamshire and Lincolnshire which formerly purchased coke from South Yorkshire have now established their own coke ovens. It is, however, to say the least, unfortunate that some of the coke oven owners have found themselves unable to fulfil the requirements for gas of your Company after its successful efforts to create the demand.

Although the coke market is still unsatisfactory there are indications of some improvements in the near future.

Perhaps the most notable event of the past year, or indeed in the history of the Company, was the signal honour conferred upon it by the visit of His Royal Highness the Duke of Kent, who graciously consented to inaugurate the large gasholder at the Wincobank Works. The ceremony took place at the end of June before a large gathering representative of the civic and industrial life of the City and district, many members of the Gas Industry from various parts of the country also being present. His Royal Highness, who was received with great enthusiasm, was good enough to express his satisfaction with all he had seen and his pleasure at the reception accorded to him.

Price of Gas.

While your Directors regret that it was found necessary to advance the price of gas one-fifth of a penny per therm—or 1d. per 1,000 cu.ft. as from the September meter readings—this could scarcely occasion surprise.

The rise in cost of practically all materials, including coke oven gas and coal, and also the necessity of manufacturing gas in increased quantities to augment the inadequate supplies of coke oven gas left your Board no alternative.

Altogether some 54 miles of new and replacement mains have been laid, including 6½ miles in connexion with the Gas Grid and 8 miles of steel main from Abbey Lane to Baslow, which will enable gas to be sent from Sheffield to your Company's works at Baslow, Bakewell, and Matlock. The total length of mains supplying the area served by the Company is now nearly 1,300 miles, and as the result of recent amalgamations we are now supplying gas from Barnsley in the north to the Matlocks in the south—a distance from north to south of approximately 45 miles.

It is interesting to note the diversity of the new work undertaken during the past year by your Company on the domestic side for the public authorities in our area of supply. The equipment of new schools includes the supplying and fixing of heating, cooking, and laboratory appliances as well as iron heaters, all of modern construction. Several gas incinerators of a new type have been supplied to hospitals. These appliances were designed to the instructions of the hospital authorities, and are proving very efficient in operation.

Another novelty is the method of overhead heating by means of gas radiant panel heaters, and this system has been adopted in several churches with success. Special attention has been paid to the development of the use of gas for central heating, and due to its successful application this method is finding increased favour.

Our relations with builders and architects continue on the best of terms, and this is reflected in the fact that during 1938 a total of almost 2,000 gas installations forming gas points in new property were installed by them to our specification.

Hotels, restaurants, and the catering trade have also placed orders with your Company for the modernizing of their kitchen equipment, and considerable progress has been made during the year in the installation of large gas-fired ovens for bread-baking purposes.

The Fittings Department has consequently been well employed, and the Sales Department has had a good year. Sales of the new streamlined cookers show a substantial increase, while sales of water heaters are up by 62% and washing machines by 75%. As a result, the amount realized has passed last year's record figure. The showrooms in Sheffield and in the outlying districts served by the Company have contributed materially to this gratifying improvement.

I have already alluded to the increased sales of industrial gas. No doubt the re-armament programme is chiefly responsible for this; but it is also evident that the efficiency and reliability of

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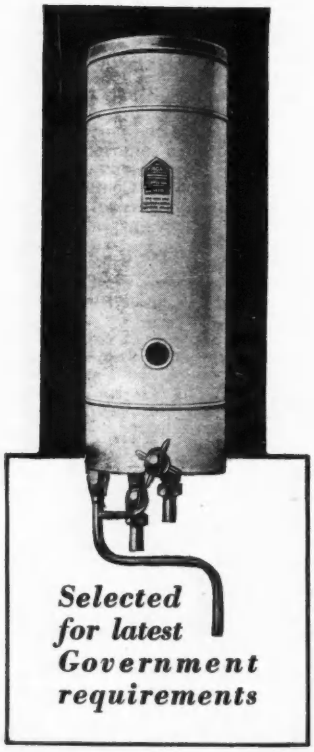

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Literature for your Showrooms available on request.

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Instantaneous Water Heater

MAIN WATER HEATERS, LIMITED
LONDON AND FALKIRK

gas, and the low price charged for it in large quantities, makes it an attractive fuel to an increasing number of industries. There are many instances where firms have, much to their advantage, changed over from other fuels to gas. I will, however, give you an instance where a firm has changed over from gas of its own manufacture to your Company's gas.

This firm installed at a very considerable capital cost a gas-making plant to supply their furnaces with water gas which they were led to believe would be a very cheap supply, a very attractive saving being shown on paper. As a result, however, of an analysis of their working costs it was discovered that this supposed cheap gas was actually costing considerably more than town gas. This firm's furnaces are now being supplied with your Company's gas and are at present consuming some 50 million cu.ft. per annum.

Furnaces incorporating your Company's patent processes continue to find favour and are being used by all the principal steel firms in Sheffield. The Research Department has been actively engaged throughout the year investigating difficulties in connexion with the use of gas for both industrial and domestic purposes.

The increasing use of gas is making a correspondingly increasing contribution in the matter of smoke abatement, and this is much appreciated by the local Statutory Authority.

The Gas Grid.

The South Yorkshire Gas Grid operated by your Company has been established now for so many years that its origin is looked upon as a matter of past history. It is not surprising that its success should bring similar schemes into operation where coke oven gas is available. It was, however, somewhat amazing to see recently a number of Press notices describing a wonderful new enterprise in the form of the first gas grid in the country to be inaugurated in West Yorkshire.

It is understood that if and when this West Yorkshire Grid comes into operation it will distribute only some 25% of the quantity of coke oven gas dealt with by the South Yorkshire Grid operated by your Company. It appears obvious that the magnitude and success of your Company's pioneer effort in the construction and operation of this South Yorkshire Gas Grid have not been adequately appreciated by the general public.

Mr. Halkett has supplied me with a few figures and particulars which may surprise you and many others. In the first place, it may interest you to know that the value of the plant at the coke ovens used to produce the gas distributed by your Company approximates to £3,000,000. The 14 coke ovens from which gas is now taken are connected up by some 100 miles of high-pressure mains ranging from 24 in. to 8 in. in diameter. More than three million tons of coal per annum are used and regular employment found for between eight and nine thousand miners in the production of the gas sent into the grid mains.

The estimated quantity of residuals obtained per annum in the course of the production of this gas is:

2 million tons of coke.
31 million gallons of tar.
90 million lb. of sulphate of ammonia.
10 million gallons of motor spirit.

As a consequence, direct employment is given to over 1,200 men at the coke ovens.

These facts and figures will give you some idea of the advantages which the South Yorkshire Gas Grid has conferred upon the coking industry, while we in Sheffield all know what it has done for the steel industry.

Two additional coking plants have been connected up to the Grid during the past year—viz., Dinnington and Mitchell Main—and in order to deal with the southern section of the Company's area of supply a set of purifiers capable of dealing with 3 million cu.ft. per day has been installed at our Effingham Street Works. I am glad to be able to assure you that these and all our other Works have been maintained in good condition.

I have no time to deal at length with the question of Air Raid Precautions, but you will like to know that schemes for the protection of our employees and Works are well in hand, though I hope they will never be needed.

I will not trench upon the matters of the further proposed addition to our area of supply to be dealt with at the Extraordinary Meeting to follow this, except to point out that year by year your Undertaking continues to expand till it is now, with the exception of Birmingham, the largest in the provinces. As a consequence, the responsibilities of your Board and especially of the General Manager and his staff continue to increase. Mr. Halkett has a unique knowledge of the Gas Industry and I need scarcely say that his services, which have been ably seconded by those of his son, have been of the greatest value during the past year. In my capacity as Chairman I am grateful for the loyal support I receive from all concerned, including the co-partner employees.

The Report and Accounts were unanimously adopted.

Extraordinary General Meeting.

An Extraordinary General Meeting immediately followed, when the CHAIRMAN said:

We are seeking your sanction first to an application which we propose to make to the Board of Trade for a Special Order authorizing the purchase of the Undertaking of the Eckington and Mosbrough Gas Company, Ltd., and the amalgamation of the Baslow Undertaking, and secondly to the raising of further capital.

The proposal to purchase the Eckington Undertaking is a continuation of the policy decided upon by your Directors a number of years ago, which is that the amalgamation of a smaller undertaking with a larger adjacent undertaking is advantageous alike to the gas consumers, the stockholders, and the Gas Industry.

As I mentioned at the Meeting preceding this one, we are also seeking your sanction to the raising of the sum of £500,000. It is proposed to apply £485,000 of this amount in repayment of the 7½% mortgages which become payable on July 15 next. Your Directors thought it advisable to make the proposed issue a round sum of £500,000 and the balance of £15,000 will be available to meet general capital expenditure.

The two resolutions were unanimously agreed and the meeting then terminated.

Brighton, Hove, and Worthing Gas Company

The Annual Ordinary General Meeting of the Brighton, Hove, and Worthing Gas Company was held on March 10 at Winchester House, Old Broad Street, London, E.C.—Mr. A. M. PADDON, M.Inst.C.E. (Chairman of the Company), presiding.

Moving the adoption of the Report and Accounts, the Chairman said: We have expended a total of £82,981 on plant and apparatus, which became necessary owing to the progress of the Company during the past year, but we have reduced that amount by £38,428, so that the net expenditure is between £44,000 and £45,000.

Coming to the revenue account and looking at the credit side first, our gas has brought us in £9,714 less. Rentals are £2,155 less, mainly accounted for by the reduced rental received from stoves on simple hire, but as these are replaced by stoves on hire-purchase no truncation of the company's business is entailed. Our total reduction in the first five items is £11,868, but residuals have brought us in just under £20,000 more, which more than balances the reductions, and the total receipts are £7,846 more than a year ago.

Coming to the debit side, coals, oil, and coke carbonized cost us £12,431 more than in the previous year, and I shall refer to that again later. Repair, maintenance, and renewals of mains, meters, and stores, &c., cost us something like £1,200 less.

Our contribution to the Co-partners' Pensions Fund—nearly £14,000—is associated with the special contribution from the Net Revenue Account. In addition we have transferred £6,000 to the Renewal Fund Account, but we have omitted altogether the £8,000 contribution which we made last year to the Special Purposes Fund; so, putting those two funds together in such inter-relationship as they may possess, we contributed £2,000 less to them this year than we did a year ago.

The number of our consumers, over 94,000, is the largest aggregate we have ever had in the history of the Company. It has increased by 2,175 during the past year.

We were charged some £12,000 more this year for our raw materials. This is not entirely due to the increased price of coal, but as our expenditure has increased by £8,189 and our receipts increased by £7,846, there is a trifling adverse balance of £343.

We have taken £3,545 from the Net Revenue Account to assist the present statement, but even that leaves us with a carry-forward of over £41,000, and as this carry-forward is specially designed to meet such charges I think we can regard the small sum we have taken as almost negligible.

With regard to the Reserve Fund Account, you will notice the handsome figure at which the investments stand—namely, a book value of £189,000. The Special Purposes Fund account shows a figure of £70,000 odd, of which £45,000 is invested. This fund replaced the old Insurance fund and represents the protection of the Company against any extraordinary or unforeseen incidents, and you will agree that there is every reason in present conditions to preserve that fund.

Mr. G. W. CAREY (Deputy-Chairman) seconded the resolution for the adoption of the Report and Accounts, and it was carried unanimously.

The proposed dividends were approved, and the retiring Director and Auditors were re-elected.

A vote of thanks to the Chairman, Directors, and staff concluded the proceedings.

GASHOLDERS

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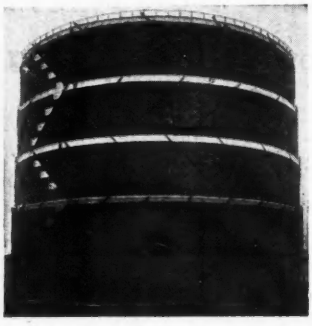
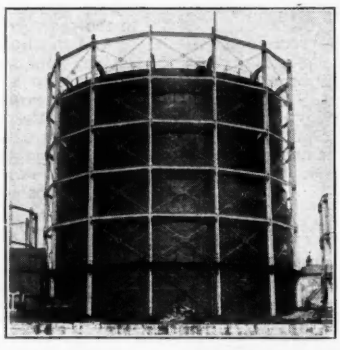
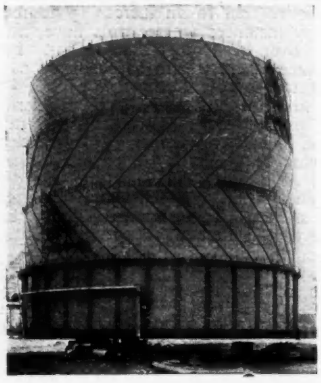
PURIFIERS
CONDENSERS
STEEL BUILDINGS
STEEL TANKS







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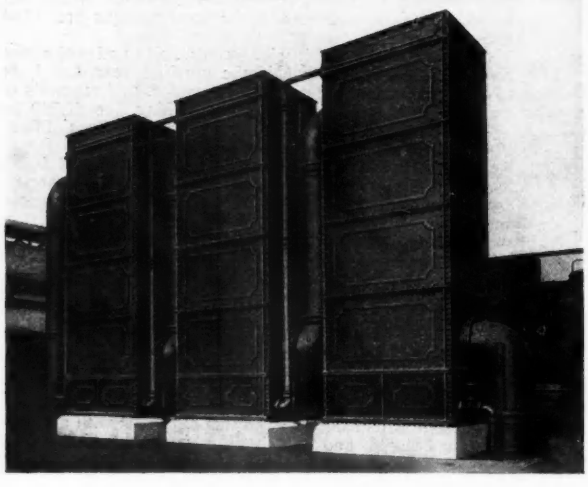

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Markets and Manufactures

Current Sales of Gas Products

The London Market

March 13.

London prices of Tar Products are as under:

Pitch, nominal, at about 28s. per ton f.o.b.
Creosote, about 3½d. to 3¾d.
Refined tar, 3¾d.
Pure toluole, about 2s. 3d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, 10s.
All per gallon naked at makers' works.

The Provinces

March 13.

Crude Gas-Works Tar, 12s. to 17s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 29s. to 30s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 29s. to 30s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 3¾d. to 4¼d.; low gravity, 4d. to 4½d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d.; filtered anthracene oil, min. gr. 1,080, 5¼d. to 5½d.; heavy tar oil, gr. less than 1,080, 4¼d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *March* 11.

There is still very little movement in the market generally and consequently prices show no alteration.

Crude gas-works tar.—The actual value is round 31s. to 33s. per ton *ex* works in bulk.

Pitch of vertical quality is easy at 21s. to 22s. per ton f.o.b. for export, and round 20s. per ton *ex* works in bulk for home trade.

Refined tar.—Home prices are maintained at 3¾d. to 4d. per gallon, while export business is keen at round 2¾d. to 3d. per gallon, both into buyers' packages at makers' works.

Creosote oil is quietly steady with makers' prices approximately as follows: Specification oil, 3¼d. to 3¾d. per gallon; low gravity, 4¼d. to 4¾d. per gallon; neutral oil, 3¾d. to 4d. per gallon; all *ex* works in bulk.

Cresylic acid.—With few orders being placed, prices are nominal as under: Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 4d. to 1s. 7d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is maintained at 5¼d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 3½d. to 1s. 4d. per gallon and 90/190 heavy naphtha is round 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—90/160 grade is 8s. 6d. to 9s. 6d. per gallon and 90/140 grade is 9s. 6d. to 10s. 6d. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole..	0 9½	to	0 10	per gall. at works
Motor " ..	1 3	"	1 3½	" " "
90% " ..	1 4	"	1 4½	" " "
Pure " ..	1 8	"	1 8½	" "

Contracts Advertised To-Day

Carburetted Water Gas Plant.
Oldbury Gas Department. [p. 757.]

Cast Iron Pipes.
Carlisle Gas Department. [p. 758.]

Coal.
Llandudno Gas Department. [p. 758.]

Gasholder.
Oldbury Gas Department. [p. 757.]

Railway Wagons.
Haverhill Gas Department. [p. 757.]

Resetting Retorts.
Kirkby-in-Ashfield Gas Department. (p. 758.]

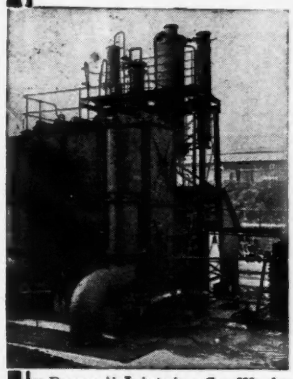
Retorts.
Skipton Gas Department. [p. 758.]

Wash Boilers (Galvanized).
Leeds Gas Department. [p. 758.]

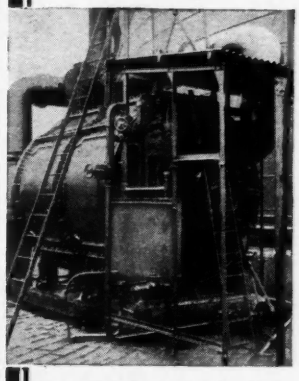
Isle of Thanet Gas Light and Coke Company

The Isle of Thanet Gas Light and Coke Company (who supply Margate) experienced a decrease of about 4% in the output of gas during the past year, as compared with 1937. There are various reasons to account for this. The most noticeable reductions in consumption were in March and November, when the weather was unusually fine. Then there has been a larger number of residents away, and empty shops and houses; while, in addition, there is the saving to those consumers who have purchased modern gas apparatus, and the Company also have very persistent competition. The actual sale of gas during the year was 2,251,892 therms, which compares with 2,361,029 therms in 1937. After payment of the usual dividend the balance carried forward is practically the same as the amount brought into account, at £13,066. During the year there has been no net change in the Capital Account, which remains in credit to the extent of a few hundreds of pounds. An increase of 6s. 9d. per ton in the cost of coal will add almost £10,000 a year to the expenditure on Revenue Account, and the Chairman remarked at the meeting: "Just how long we can supply gas at 7d. per therm will depend upon future coal contracts and the receipts from residuals."

25 Years' Hard!



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints like these in important Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil — screw pipe or flange.

Send for particulars

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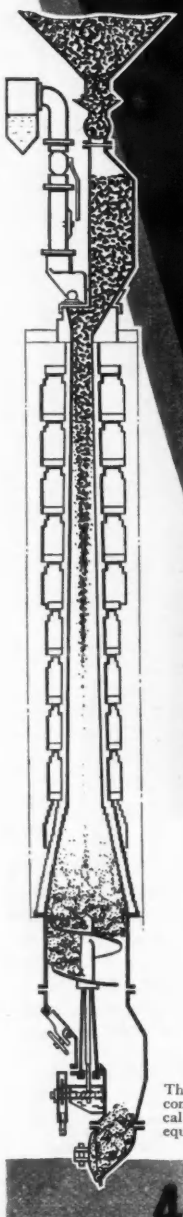
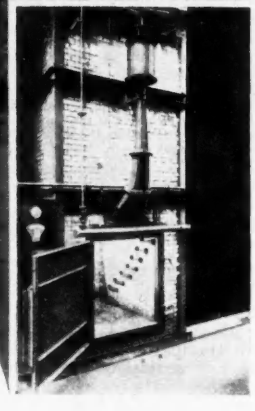
WEST'S

Three installations of Glover-West vertical retorts, with coke-grading and waste-heat recovery equipment, at the Cottesloe gasworks of the Johannesburg Municipal Gas Department, and *(below)* step-grate producer equipped with steam-jet air injector to facilitate the burning of small coke and breeze under pressure—a view in the Glover-West vertical retort house at the Meadow Lane works of the Leeds Corporation Gas Department.

Carbonizing Plants



The Glover-West continuous vertical retort and equipment.



- Increased capacity in relation to ground area covered.
- Output readily adjustable to meet fluctuating demands.
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- Clean working conditions within the retort house.
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AND WESTVERTICAL CARBONIZING CHAMBERS

434 PLANTS BUILT OR ORDERED IN 24 COUNTRIES

GAS STOCKS AND SHARES

The buying movement expanded on the Stock Exchange last week and the upward movement in values continued. Supplies were still somewhat limited so that the increases in many directions were substantial, but with profit-taking in evidence towards the close a number of stocks finished below the best. British Funds were a strong feature and closed up to 1¼ points higher on the week, while home rails continued prominent—several issues showing large gains. Buying became more selective in the industrial section, and although the majority of shares showed improvement the heavy appreciations of the previous week were not sustained in all cases. Oil and rubber shares were also in good demand, and prices were firm.

The volume of business in the Gas market was also on a larger scale, and although there were few price changes other than *ex* div. movements, most of these were on the upgrade. Gas Light units are usually the barometer of this market, and after a somewhat long period of depression these have now begun to improve, closing 6d. higher at 21s. 9d. Two of the Company's fixed-interest stocks also hardened. With the more encouraging view of the European outlook, Imperial Continental stock has once again begun to improve, and rose 5 points to 124½.

With regard to the paragraph in last week's Report dealing with the results of the past year and the possibilities of the future, it is important to note Mr. A. M. Paddon's views on "gas" as an investment expressed in his interesting address to the stockholders at the Brighton, Hove, and Worthing Gas Company's Annual Meeting held on Friday last. Mr. Paddon's remarks on the economy of fuel and the country's need of the Industry for defence and many other purposes beyond its customary duties of supplying light, heat, and power should be given wide publicity. Having regard to the Industry's vital resources, it is not altogether clear that the Government's electrical propaganda is in the best interests of the country.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations March 10.	Rise or Fall on Week.
1,767,439	Mar. 6	8	8	Alliance & Dublin Ord. ...	135—145*	...
374,000	Dec. 19	4	4	Do. 4 p.c. Deb. ...	93—98	...
734,733	Nov. 7	5	5	Asscd. Gas & Water U'd'ts Ord.	17/-—19/-	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/-	...
444,389	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	19/—21/-	...
296,523	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/-	...
500,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97*	−1
560,070	Feb. 20	7	7	Barnet Ord. 7 p.c.	155—160	...
300,000	Oct. 10	1/9⅜	1/4½	Bombay, Ltd.	22/-—24/-	...
180,435	Feb. 20	9½	9½	Bournemouth sliding scale ...	192—202	...
690,526	,,	7	7	Do. 7 p.c. max. ...	155—160	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	128—133	...
50,000	Dec. 19	3	3	Do. 3 p.c. Deb. ...	75—80	...
362,025	,,	4	4	Do. 4 p.c. Deb. ...	95—100	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
357,900	Feb. 20	7½	7½	Brighton, &c., 6 p.c. Con. ...	141—146	...
659,955	,,	6½	6½	Do. 5 p.c. Con. ...	124—129	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	125—130	...
855,000	Sept. 19	8	7	British Ord.	130—135	...
100,000	Dec. 19	7	7	Do. 7 p.c. Pref.	138—143	..
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	112—117	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
100,000	22May'33	6	4	Cape Town, Ltd.	1—2	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref ...	1—2	...
150,000	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	Feb. 6	6	6	Cardiff Con. Ord.	116—121	...
237,860	Dec. 19	5	5	Do. 5 p.c. Red. Deb. ...	103—108	..
98,936	Sept. 19	2/-	2/-	Colombo Ord.	1½—1¾	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	22/6—24/6	...
739,453	Oct. 10	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/6—25/6	...
1,775,005	Jan. 23	5	4	Commercial Ord.	55—65	...
140,000	Feb. 6	§13/4	4	Do. 4 p.c. Red. Pref. ...	95—100	...
620,000	Dec. 5	3	3	Do. 3 p.c. Deb. ...	66—71	...
286,344	Feb. 20	5	5	Do. 5 p.c. Deb. ...	110—115	...
200,000	,,	§8	4	Do. 3½ p.c. Red. Deb. ...	95—100	...
807,560	Feb. 20	7	7	Croydon sliding scale ...	133—138	...
644,590	,,	5	5	Do. max. div.	98—103	...
620,385	Dec. 19	5	5	Do. 5 p.c. Deb. ...	112—117	...
239,000	Feb. 6	5	5	East Hull Ord. 5 p.c. ...	93—98	...
186,155	Feb. 6	6	6	East Surrey Ord. 5 p.c. ...	113—118	...
176,211	Dec. 5	5	5	Do. 5 p.c. Deb. ...	112—117	...
250,000	Nov. 7	8	4	Gas Consolidation Ord. 'B' ...	19/—21/-	...
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
19,189,963	Feb. 6	5⅜	5⅜	Gas Light & Coke Ord. ...	21/3—22/3a	+-/6
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	72—77	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	92—97	...
2,993,000	Jan. 9	3½	3½	Do. 3½ p.c. Red. Pref. ...	94—99	+1
8,602,497	Nov. 21	3	3	Do. 3 p.c. Con. Deb. ...	73—78	+1
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	108—112	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	105—109	...
700,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97*	...
270,466	Feb. 20	6	6	Harrogate New Cons. ...	115—120	...
157,500	Mar. 21	1/2⅝	‡1/-	Hong Kong and China Ord. ...	⅝—¾	...
213,200	Feb. 6	5½	6	Hornsey Con. 3½ p.c. ...	97—102	...
5,600,000	Oct. 24	12	8	Imperial Continental Cap. ...	122—127	+5
172,810	Jan. 23	3½	3½	Do. 3½ p.c. Red. Deb. ...	88—93	...
235,242	Mar. 6	8½	8½	Lea Bridge 5 p.c. Ord. ...	158—163*	−2
63,480	Dec. 19	3	3	Maidstone 3 p.c. Deb. ...	68—73	...
45,000	Nov. 21	†10	†10	Malta & Mediterranean ...	130—135	...
				Metropolitan (of Melbourne)		
392,000	Oct. 3	5½	5½	5½ p.c. Red. Deb.	100—105	...
231,977	Feb. 20	5	5	M.S. Utility 'C' Cons. ...	96—101	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref. ...	91—96	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations March 10.	Rise or Fall on Week.
390,076	Dec. 19	4	4	M.S. Utility 4 p.c. Deb. ...	93—98	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	112—117	...
125,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Bds.	94—97	...
675,000	Nov. 21	†6	†6	Montevideo, Ltd.	70—75	...
250,000	Mar. 6	7½	7½	North Middlesex 6 p.c. Con.	140—145*	−2
396,160	Feb. 6	5	5	Northampton 5 p.c. max. ...	105—110	...
300,000	Oct. 24	†7	†9	Oriental, Ltd.	145—150	...
468,537	Dec. 5	8	7½	Plymouth & Stonehouse 5 p.c.	130—140	...
621,667	Feb. 20	8½	8½	Portsmouth & Gosport Cons.	154—159	...
241,446	,,	5	5	Do. 5 p.c. max. ...	98—103	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	105—110	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	88—93	...
114,000	Feb. 6	5	5	Preston 5 p.c. Pref.	105—110	...
247,966	Dec. 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	96—101	...
625,959	Jan. 9	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Mar. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	8—9*	−½
441,275	Sept. 19	1/1⅝	1/1½	Severn Val. Gas Cor. Ld. Ord.	20/6—22/6	...
460,810	Sept. 19	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Mar. 6	8½	5	Shrewsbury 5 p.c. Ord. ...	141—146*	−2
9,000	June 3	4	‡4	South African Ord.	4¼—5½	...
1,371,752	Aug. 22	1/2⅝	1/2⅝	South East'n Gas Cn. Ld. Ord.	21/6—23/6	...
871 636	Mar. 6	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/-*	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	17/—19/-*	...
450,000	Feb. 6	4	4	Do. 4 p.c. Deb.	96—101	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
6,709,895	Feb. 6	5	6	South Met. Ord.	97—101	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	125—130	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	92—97	...
1,895,445	Dec. 19	3	3	Do. 3 p.c. Deb.	72—77	...
1,000,000	Jan. 9	5	5	Do. 5 p.c. Red. Deb. ...	107—110	...
600,000	,,	§31/-	3⅜	Do. 3½ p.c. Red. Deb. ...	98—101	...
1,543,795	Jan. 23	6	6	South Suburban Ord. 5 p.c. ...	109—114	−1
512,825	,,	5	5	Do. 5 p.c. Pref.	105—110	...
500,000	,,	4	4	Do. 4 p.c. Pref.	92—97	...
250,000	,,	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	91—96	...
888,587	Dec. 5	5	5	Do. 5 p.c. Deb.	111—116	...
250,000	,,	4	4	Do. 4 p.c. Deb.	93—98	...
200,000	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
427,859	Sept. 19	8	9⅜	S. Western Gas & Water Ord.	16/—18/-	...
160,523	Oct. 10	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pf.	19/—21/-	...
110,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	93—98	...
750,541	Feb. 6	5	5½	Southampton Ord. 5 p.c. ...	104—109	...
148,836	Dec. 19	4	4	Do. 4 p.c. Deb.	93—98	...
350,000	Feb. 6	5½	5½	Swansea 5½ p.c. Red. Pref. ...	105—110	...
200,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97	...
1,076,490	Feb. 20	6½	6½	Tottenham and District Ord.	123—128	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref.	114—119	...
62,235	,,	5	5	Do. 5 p.c. Pref.	105—110	...
334,615	Dec. 5	4	4	Do. 4 p.c. Deb.	93—98	...
85,701	Jan. 9	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100	...
1,131,550	Aug. 22	6	4	U. Kingdom Gas Cor. Ord. ...	18/—19/-	...
1,051,280	Nov. 7	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/—21/-	...
762,241	,,	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/-	...
745,263	Dec. 19	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	15/6—17/6	...
1,066,186	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99*	...
375,689	Mar. 6	7	7	Uxbridge, &c., 5 p.c.	123—128*	−2
133,010	,,	5	5	Do. 5 p.c. Pref. ...	103—108*	−2
1,371,138	Jan. 23	7	7	Wandsworth Consolidated ...	122—127	...
2,525,768	,,	4	4	Do. 4 p.c. Pref.	90—95	...
1,343,964	Dec. 19	5	5	Do. 5 p.c. Deb. ...	111—116	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	93—98	...
400,000	,,	§25/-	3⅜	Do. 3⅜ p.c. Red. Deb. ...	96—101	...
558,342	Feb. 6	6⅝	6⅝	Watford and St. Albans Ord.	127—132	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	105—110	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	112—117	...
200,000	,,	4	4	Do. 4 p.c. Red. Pref. ...	95—100	...
200,000	,,	§16/8	4	Do. 4 p.c. Red. Deb. ...	93—98	...
200,000	Dec. 19	4	4	Do. 3½ p.c. Red. Deb. ...	92—97	...
200,000	,,	3½	3½			

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations March 10.	Rise or Fall on Week.
202,152	Sept. 5	5	5	Ascot Ord.	101—106	...
128,182	Dec. 19	5	5	Do. 5 p.c. Pref.	107—112	...
31,035	Aug. 22	–/4½	–/4½	Associated Utilities 4 p.c. Pref.	16/—18/–	...
100,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Feb. 20	8	8	Bognor Orig. Ord. 'A' ...	152—162	...
62,210	,,	8	8	Do. New Addl. 'A' ...	152—162	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	142—152	...
37,440	Feb. 6	10	10	Cam. Univ. & Town 10 p.c. max.	183—193	...
125,970	,,	7	7	Do. 7 p.c. max.	131—136	...
39,025	,,	5	5	Do. 5 p.c. max.	95—100	...
96,410	Feb. 6	4½	4½	Cardiff 4½ p.c. Pref.	93—98	...
150,000	Feb. 20	4	4	Croydon 4 p.c. Pref.	91—96	...
130 000	Dec. 19	4	4	Do. 4 p.c. Deb.	93—98	...
65,000	Mar. 6	7⅛	7⅛	Eastbourne 'A' 5 p.c. ...	130—135*	—10
198,000	,,	6	6⅝	Do. 'B' 3½ p.c.	111—116*	—2
112,312	,,	5	5	Do. 5 p.c. Pref.	105—110*	—2
130,000	Dec. 19	5	5	Do. 5 p.c. Deb.	110—115	...
24,000	Feb. 20	8½	8½	Great Yarmouth 8½ p.c. max.	30—35	—10
59,400	,,	7½	7½	Do 7½ p.c. max.	27—32	—3
51,160	Dec. 5	5⅛	5⅛	Do. 5½ p.c. Deb.	117—122	...
152,600	Feb. 20	8	9	Guildford Cons.	160—165	...
54,055	,,	5	5	Do. 5 p.c. Pref.	103—108	...
68,250	Dec. 19	5	5	Do. 5 p.c. Deb.	109—114	...
156,600	Feb. 20	7½	7½	Hampton Court Cons. ...	123—128	...
80,000	Mar. 6	4	4	Lea Bridge 4 p.c. Pref. ...	90—95*	...
60,000	,,	6	6	Do. 6 p.c. Pref.	120—125*	—1
94,876	Dec. 5	4	4	Do. 4 p.c. Deb.	92—97	...
73,620	Mar. 6	8⅛	8⅛	Luton Cons. 'A'	150—160*	—3
107,960	Sept. 19	5⅛	4	Mid Kent Ord.	8½—9½	...
230,940	Feb. 6	10	10	Oxford & District Ord. ...	192—197	...
47,112	,,	5	5	Do. 5 p.c. Pref.	104—109	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,193	Nov. 7	7⅛	7⅛	Peterborough Ord.	137—142	...
64,990	Mar. 6	7⅛	7⅛	Redditch Ord....	115—125*	—3
166,850	Feb. 6	8	8	Romford Ord....	142—147	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—102	...
44,000	Sept. 19	5	5	Do. 5 p.c. Deb.	110—115	...
25,570	Feb. 6	5½	5½	Rugby 5½ p.c. Pref.	118—123	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	117—122	...
110,950	Feb. 20	8	8	Ryde Ord.	137—147	...
270,086	Sept. 5	7	7	Slough Ord.	128—133	...
21,000	Dec. 19	5	5	Do. 5 p.c. Deb.	107—112	...
28,872	Nov. 7	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	17/—19/–	...
28,866	Mar. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	17/—19/–*	...
117,228	Feb. 20	5	7	Swindon Cons.	100—105	...
60,425	Dec. 5	5	5	Do. 5 p.c. Deb.	108—113	...
64,380	Dec. 19	5	5	Torquay & Paignton 5 p.c. Pref.	105—110	...
130,000	Feb. 6	5	8	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	92—97	...
82,000	Jan. 23	6	6	Weymouth Ord.	101—106	...
98,384	Feb. 6	6	6	Wolverhampton 6 p.c. Pref.	117—122	...
160,000	Dec. 19	5½	5½	Do. 5½ p.c. Rd. Db.	103—108	...
90,000	Dec. 19	5	5	York 5 p.c. Red. Deb. ...	102—107	...
133,640	Feb. 20	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	115—120	...
120,000	,,	5	5	Do. 5 p.c. Pref.	103—108	...
35,000	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	115—120	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations March 10.	Rise or Fall on Week.
347,756	Feb. 6	5	6	Bath Cons.	115—117	...
1,667,250	Feb. 6	5	5	Bristol, 5 p.c. max.	109½—111½	...
120,420	Dec. 19	4	4	Do. 1st 4 p.c. Deb. ...	98—101	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	98—101	...
328,790	,,	5	5	Do. 5 p.c. Deb.	115—118	...
274,000	Feb. 20	5	5	Newport (Mon.) 5 p.c. max. ...	95—98	...
13,200	Sept. 19	8⅔	7	Pontyp'l Gas & W. 10 p.c. 'A'	12½—13½	...
13,600	,,	6	5	Do. 7 p.c. 'B' ...	11½—12½	...
40,000	,,	6	5	Do. 7 p.c. 'C' ...	11½—12½	...
140,778	Feb. 6	5	5	Weston-super-Mare Cons. ...	103½—105½	—½
64,338	Dec. 19	4	4	Do. 4 p.c. Deb. ...	98—101	...
33,340	,,	7⅛	7⅛	Do. 7½ p.c. Deb. ...	149—152	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations March 10.	Rise or Fall on Week.
157,150	Feb. 6	5	6½	Chester 5 p.c. Ord.	107—110	...
92,500	Dec. 19	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Feb. 20	6	6	Liverpool 5 p.c. Ord.... ...	120—122	...
245,500	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	100—105	...
306,083	Jan. 23	4	4	Do. 4 p.c. Deb.... ...	100—102	...
106,280	Feb. 6	10	10	Preston 'A' 10 p.c.	177—187	...
188,219	,,	7	7	Do. 'B' 7 p.c.	129—139	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations March 10.	Rise or Fall on Week.
122,577	Feb. 20	8	8	Blyth 5 p.c. Ord.	157½—158½	...
732,000	Feb. 20	3	3	Hartlepool G. & W. Cn. & New	67½—68½	...
2,061,315	Feb. 6	5	5⅛	Newcastle & Gateshead Con.	22/6–23/3a	...
682,856	,,	4	4	Do. 4 p.c. Pref. ...	98½—99½	...
776,706	Dec. 19	3½	3½	Do. 3½ p.c. Deb. ...	88—89	...
277,285	Oct. 24	5	5	Do. 5 p.c. Deb. '43 ...	103½—105½	...
332,351	Feb. 6	6	6	Sunderland 6 p.c. max. ...	132½—134½	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations March 10.	Rise or Fall on Week.
542,270	Feb. 6	6	9	Derby Con.	132—137	...
55,000	Dec. 19	4	4	Do. 4 p.c. Deb. ...	100—105	...
20,000	Dec. 19	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations March 10.	Rise or Fall on Week.
10,000	Feb. 6	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,806,339	Feb. 20	6½	6½	Sheffield Cons.	135½—137½	...
95,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—102	...

a The quotation is per £1 of Stock.
* Ex div.

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